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(54) PINLESS SUPPORT ATTACHMENT FOR OPERATING TABLE

(57) According to the present disclosure, a patient support device 10 includes a pair of end supports 12 and includes a patient support top 14, a support bracket 16, and a catch assembly 22 that is slidably attached to the support bracket 24 and that is operable to receive a connector 18, 20 of the patient support top 14.

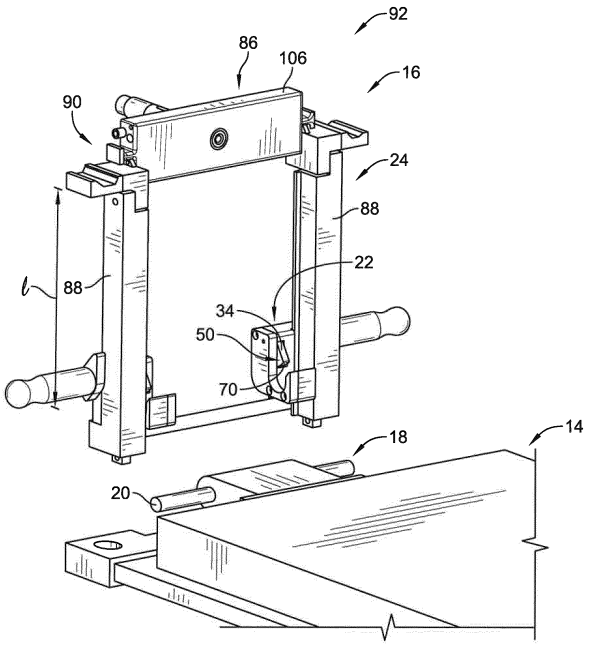

FIG. 2

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Description

[0001] The present disclosure relates to devices, systems, and methods for patient support. More specifically, the present disclosure relates to devices, systems, and methods for surgical patient support.

[0002] Patient supports, such as surgical support tables, provide support to various portions of a patient's body. Versatile positioning of table tops of the patient supports provides access to various parts of a patient's body. Moreover, various types of table tops can accommodate the surgical needs of different patients, different techniques and/or procedures, and/or preferences of the surgical team. Spinal surgery tables may have a base unit and a variety of different types of table tops that attach to the base unit depending upon the surgical procedure to be performed.

SUMMARY

[0003] The present application discloses one or more of the following features alone or in any combination.

[0004] According to an aspect of the disclosure, a top-loading patient support device may include a patient support top that may include a connector disposed at a longitudinal end thereof and an end support that may be configured to support the patient support top. A support bracket may be connected to the end support. A catch assembly may be attached to the support bracket for selectively receiving the connector of the patient support top. The catch assembly may include a main body extending between opposite ends and a pair of catch holds that may extend from the main body. Each of the catch holds may include a catch body and a catch arm that may extend from the catch body to define a receptacle that may have an open top for receiving the connector of the patient support top. The catch assembly may include a latch assembly that may have a latch that may be operable between a first position in which the latch is retracted from the open top of the receptacle and a second position in which the latch extends at least partly across the open top of the receptacle to block removal of the connector from the receptacle.

[0005] In some embodiments, the latch may be pivotably attached to an interior side of one of the catch holds. Each catch body may include a top surface and each respective catch arm may include a side surface. The respective top and side surfaces of each catch hold together may define at least a portion of the receptacle. Each latch may include a top surface and a side surface that together may define a latch receptacle. When the latch is in the second position, the top surface of the latch may be aligned with the top surface of the catch body to form a continuous surface for engagement with the connector of the patient support top. In some embodiments, when the latch is in the second position, the side surface of the latch may be aligned with the side surface of the catch body to form a continuous side surface.

[0006] In some embodiments, the latch may include an end section that may protrude at least partly across the open top when the latch is in the second position. Optionally, the end section may be arranged out of alignment with the open top when the latch is in the first position. In some embodiments, the latch assembly may include a spring that may be configured to bias the latch into the second position. In some embodiments, the catch assembly may include a pawl assembly that may include a pawl to selectively fix the position of the catch assembly relative to the support bracket. The pawl may be operable between a locked position and an unlocked position, for example.

[0007] In some embodiments, the pawl may include a lever that may have a pivot end, a free end opposite the pivot end, and a pawl head that may extend from the free end for engagement with teeth of the support bracket. In some embodiments, the support bracket may include a pawl track that may have a number of teeth consecutively arranged for engagement with the pawl head. Each tooth may include a flat surface and a curved surface that may be opposite the flat surface. The flat surface of one tooth of the number of teeth, together with the curved surface of an adjacent tooth of the number of teeth, may cooperate to define a pawl space for receiving the pawl head therein.

[0008] In some embodiments, the pawl head may be selectively received within the pawl space. The pawl head may be blocked against removal from the pawl space while in contact with either of the curved surface or the flat surface of the corresponding tooth. In some embodiments, the pawl head may be triangular.

[0009] According to another aspect of the disclosure, a top-loading patient support device may include a patient support top including a connector that may be disposed at a longitudinal end thereof, a pair of end supports that may be configured to support the patient support top, and a catch assembly that may be attached to one of the end supports and that may include a catch device and a latch assembly. The catch device may include a catch housing and a support arm that may extend from the catch housing. The support arm may include a top surface that defines a receptacle having an open top for receiving the connector of the patient support top. The latch assembly may include a latch that may be coupled to the catch housing and that may be pivotable about a pivot axis between a first position that is retracted from the open top of the receptacle and a second position in which the latch extends at least partly across the open top of the receptacle to block removal of the connector from the receptacle.

[0010] In some embodiments, the catch housing may include a main body and a cover that may be configured for attachment to the main body. The main body may define an interior and the latch may be received within the interior. The latch may include a latch body having a stem that may be pivotably connected at one end to the catch housing. A tab may extend from the stem in a pivot

plane of the latch. In some embodiments, in the first position the tab may be arranged within the interior of the main body and in the second position the tab may protrude from the main body at least partly across the open top of the receptacle to block removal of the connector from the receptacle.

[0011] In some embodiments, the stem may be configured to receive force by a user to pivot the latch between the first and second positions. Optionally, the latch assembly may include a resilient member that may be arranged to bias the latch into the second position. In some embodiments, the tab may include a slanted upper surface that may be adapted for contact with the connector of the patient support top to pivot the latch from the second position towards the first position to permit passage of the connector through the open top of the receptacle. Alternatively or additionally, the tab may include a lower surface that may be adapted for contact with the connector of the patient support top and that may face radially outward from the pivot axis such that contact with the connector may not pivot the latch from the second position towards the first position to block removal of the connector from the receptacle.

[0012] In some embodiments, the top surface of the support arm may have a U-shape. In some embodiments, the open top of the receptacle may be sized to allow the connector of the patient support top to pass therethrough into the receptacle.

[0013] According to another aspect of the present disclosure, a patient support device may include a patient support top having a connector disposed at an end thereof, an end support configured to support the patient support top, and a support attachment connected with the end support. The support attachment may include a catch assembly configured for selective connection with the connector of the patient support top. The catch assembly may include a receptacle for receiving the connector. The catch assembly may include a latch assembly for selectively blocking removal of the connector from the receptacle. The receptacle may include an entry opening for acceptance of the connector of the patient support top into the receptacle.

[0014] In some embodiments, the latch assembly may include a latch operable between a first position in which the latch is clear from the entry opening to allow acceptance of the connector within the receptacle and a second position in which the latch extends at least partly across the entry opening to block removal of the connector from the receptacle. In some embodiments, the support attachment may include a bracket and the catch assembly may be connected with the bracket. The bracket may include a tilt assembly for selective pivoting of the catch assembly while secured with the end support to assist selective connection with the patient support top.

[0015] In some embodiments, the tilt assembly may include a release gate secured with the end support and attached to a rail of the bracket for selective pivoting of the catch assembly. The tilt assembly may include a tilt lock assembly operable between an unlatched state to allow pivoting of the rail relative to the release gate and a latched position to block pivoting of the rail relative to the release gate.

[0016] In some embodiments, the tilt lock assembly may include a lock shaft rotatably mounted in one of the rail and the release gate. The lock shaft may be operable between a locked position to engage both the rail and the release gate to block relative pivoting and an unlocked position to at least partly disengage with the other of the rail and the release gate to allow relative pivoting. In some embodiments, the tilt lock assembly may include a lock slot defined within the other of the rail and the release gate.

[0017] In some embodiments, the lock slot may include a lock home and a pivot route extending for a length from the lock home. In some embodiments, the length of the pivot route may have a curvature corresponding with pivoting of the rail relative to the release gate. In some embodiments, the lock shaft may extend into the lock slot. The lock shaft and the lock slot may be formed in correspondence with each other to permit relative traversal of the lock shaft within the pivot route only in the unlocked position. In some embodiments, the lock shaft may have a non-circular cross-section. In some embodiments, the lock shaft may have a bean shaped cross-section.

[0018] In some embodiments, the lock shaft may extend into the lock slot. The lock shaft and the lock slot may be formed in correspondence with each other to prevent relative entry of the lock shaft into the pivot route in the locked position. In some embodiments, the lock shaft and the lock slot may be formed in correspondence with each other to permit selective rotation of the lock shaft only when arranged within the lock home.

[0019] According to another aspect of the present disclosure, a support attachment of a patient support device for attachment between an end support and a connector of a patient support top of the patient support device may include a bracket adapted to connect with the end support, a catch assembly attached with the bracket, the catch assembly including a receptacle for receiving the connector of the patient support top and a tilt assembly including a release gate pivotably connected with the bracket. The tilt assembly may include a tilt lock assembly operable between an unlocked state to allow pivoting of the bracket relative to the release gate and a locked state to block pivoting of the bracket relative to the release gate. In some embodiments, the catch assembly may include a latch assembly for selectively blocking removal of the connector from the receptacle.

[0020] In some embodiments, the catch assembly may include a pawl assembly having a pawl adapted to selectively fix the position of the catch assembly relative to the bracket. The pawl may be operable between a locked position and an unlocked position.

[0021] In some embodiments, the pawl may include a lever having a pawl end and a pawl head that extends from the pawl end for engagement with the bracket. In

some embodiments, the bracket may include a pawl track having a number of teeth consecutively arranged for engagement with the pawl head to selectively fix the position the catch assembly relative to the bracket. In some embodiments, each tooth may include a first surface and a second surface opposite the first surface. The first surface of one tooth of the number of teeth together with the second surface of an adjacent tooth of the number of teeth may cooperate to define a pawl space for receiving the pawl head therein to selectively fix the position of the catch assembly.

[0022] In some embodiments, the pawl head may be selectively received within the pawl space. The pawl head may blocked against removal from the pawl space by at least one of the first and second surfaces of the corresponding teeth without unloading of the catching assembly.

[0023] In some embodiments, the lever may be pivotable to place the pawl between the locked and unlocked positions. Pivoting movement of the lever of the pawl may correspond with the pawl space, as defined by the first and second surfaces, to require that the pawl head be located intermediately within the pawl space arranging the pivoting movement of the lever to be free of contact between the pawl head and either of the first and second surfaces to allow the pawl to be operated into the unlocked position. In some embodiments, the pawl head may be arranged intermediately within the pawl space by translation of the catch assembly along the bracket with the pawl in the locked position.

[0024] In some embodiments, the support attachment may include a tilt section for connecting the bracket with the end support. The tilt section may include a locking pin slidably disposed in the support bracket for engagement with the end support. The locking pin may be operable between a locked position projecting from the bracket for engagement with the end support and unlocked position retracted into the bracket.

[0025] In some embodiments, the tilt section may include a safety latch assembly having a safety pin and a pin slot receiving the safety pin. The safety pin may include a first section having a first diameter and may include a second section having a second diameter larger than the first diameter.

[0026] In some embodiments, the pin slot may include a latch receptacle sized complimentary to the second section of the safety pin and a slide receptacle sized complimentary to the first section of the safety pin. In some embodiments, the safety pin may be operable between a latched position in which the second section is received within the latch receptacle to prevent translation of the safety pin along the pin slot to block operation of the locking pin out of the locked position, and an unlatched position in which the second section is removed from the latch receptacle to permit translation of the safety pin along the pin slot to allow removal of the locking pin from the locked position.

[0027] In some embodiments, the release gate may be attached to a rail of the bracket for selective pivoting and may be adapted for securing with the end support. The release gate may include a tilt lock assembly having a lockout member positionable between a locked position and an unlocked position to achieve the locked and unlocked states of the tilt lock assembly, respectively.

[0028] In some embodiments, the lockout member of the tilt lock assembly may include a lock shaft rotatably arranged in at least one of the rail and the release gate. The lock shaft may be operable between a locked position to engage both the rail and the release gate to block relative pivoting and an unlocked position to allow relative pivoting. In some embodiments, the tilt lock assembly may include a lock slot defined within the other of the release gate and the rail. The lock slot may include a lock home and a pivot route extending for a length from the lock home.

In some embodiments, the length of the pivot route may have a curvature corresponding with pivoting of the rail relative to the release gate.

[0029] In some embodiments, the lock shaft may extend into the lock slot. The lock shaft and the lock slot may be formed in correspondence with each other to permit relative traversal of the lock shaft within the pivot route only in the unlocked position. In some embodiments, the lock shaft may have a non-circular cross-section. In some embodiments, the lock shaft may have a bean shaped cross-section.

[0030] In some embodiments, the lock shaft may extend into the lock slot. The lock shaft and the lock slot may be formed in correspondence with each other to prevent relative entry of the lock shaft into the pivot route in the locked position. The lock shaft and the lock slot may be formed in correspondence with each other to permit selective rotation of the lock shaft only when arranged within the lock home.

[0031] The invention will now be further described by way of example with reference to the accompanying drawings, in which:

[0032] The detailed description particularly refers to the accompanying figures in which:

Fig. 1 is a perspective view of a patient support system including a tower base connected to a patient support top by support attachments including a support bracket and a catch assembly that is selectively positionable along the length of the support bracket and that defines a receptacle for receiving a connection tube of the patient support top;

Fig. 2 is a perspective view of a support attachment of the patient support system shown in Fig. 1 showing that the catch assembly is a top-loading assembly and includes a pair of catch holds that define the receptacle for receiving the connection tube of the patient support top;

Fig. 3 is a perspective view of the catch assembly of the patient support system shown in Figs. 1 and 2 showing the catch holds each including a latch that

is movable between latched and unlatched positions;

Fig. 4 is a perspective view of the catch assembly shown in Fig. 3 showing the connector of the patient support top received within the receptacle of the catch holds and the latches in the latched position extending partly across the open top of the receptacle to block removal of the connector from the receptacle;

Fig. 5 is an exploded perspective view of one of the catch assemblies of Figs. 1-4;

Fig. 6 is a perspective view of the support attachment of Figs. 1 and 2 showing that the catch assembly is selectively positionable along a length of the support bracket;

Fig. 7 is a closer perspective view of the support attachment of Fig. 6 with a bracket rail of the support bracket being shown as transparent to illustrate that the support attachment includes a pawl assembly for selectively fixing the position of the catch assembly relative to the support bracket;

Fig. 8 is rear perspective view of the support attachment of Figs. 1-7 showing the support bracket spaced beneath a mounting bar of the tower base, showing the support bracket including angled slots that receive pins of the mounting bar and showing the support bracket including retractable locking pins for insertion into holes of the mounting bar to provide connection of the support bracket to the mounting bar;

Fig. 9 is a front perspective view of the support attachment of Fig. 8 showing that, to attach the support bracket to the mounting bar, the support bracket is angled and the angled slots are aligned with the pins of the mounting bar while the retractable locking pins are in a retracted position;

Fig. 10 is a front perspective view of the support attachment of Fig. 9 showing that, to complete attachment of the support bracket to the mounting bar, the mounting bar pins are received within the angled slots of the support bracket, the support bracket is rotated to vertical (in the orientation as shown in Fig. 10), and the retractable locking pins are moved into the holes of the mounting bar to secure the support bracket to the mounting bar;

Fig. 11 is a perspective view of the support attachment of Fig. 10 showing the support bracket including a tilt assembly for pivoting the support bracket while the support bracket is attached to the mounting bar to assist connection of the catch assembly with the patient support top and showing that the tilt assembly permits pivoting by placing a connection pin arranged in a disconnection position;

Fig. 12 is a perspective view of the support attachment of Fig. 11 showing that the connection tube is received within the receptacle and that the tilt assembly is arranged to restrict pivoting of the support bracket by the connection pin arranged in a connection position;

Fig. 13 is a front perspective view of another support attachment adapted for use with the patient support system of Fig. 1 showing the support attachment including a support bracket and a catch assembly attached to the support bracket and having a main body, a pair of catch holds, and a latch assembly;

Fig. 14 is a rear perspective view of the support attachment of Fig. 13 showing the catch assembly defining a receptacle for receiving the connection tube of the patient support top;

Fig. 15 is a front perspective view of the catch assembly of the support attachment of Figs. 13 and 14;

Fig. 16 is an exploded perspective view of the catch assembly of the support attachment of Figs. 13-15;

Figs. 17-19 are front perspective views of the support attachment of Figs. 13 and 14 showing connection between the connection tube of the patient support top and the catch assembly of the support attachment receiving the connection tube within the receptacle and engaging the latch assembly to block removal of the connection tube from the receptacle;

Fig. 20 is a perspective view of the support attachment of Figs. 13, 14, and 17-19 illustrating a rail of the support bracket as transparent to show that the support attachment includes a pawl assembly including a pawl of the catch assembly and a ratchet of the support bracket and showing that the pawl assembly is operable to selectively fix the position of the catch assembly along the length of the support bracket;

Fig. 21 is a closer perspective view of a portion of the support attachment of Fig. 20 showing that the pawl of the catch assembly engages with teeth of the ratchet to secure the position of the catch assembly relative to the support bracket and showing that removal of the pawl from engagement with the ratchet is restricted to prevent unintended movement of the catch assembly relative to the support bracket;

Fig. 22 is a perspective view of the support attachment of Fig. 20 showing that the catch assembly has been raised relative to the support bracket so that a head of the pawl floats within a gap defined between adjacent teeth of the ratchet;

Fig. 23 is a perspective view of the support attachment of Fig. 22 showing that by raising the catch assembly relative to the support bracket so that a head of the pawl floats within the gap defined between adjacent teeth of the ratchet a rotational path of the pawl permits the pawl to disengage from the ratchet to allow sliding movement of the catch assembly along the length of the support bracket;

Fig. 24 is a perspective view of another support attachment adapted for use in the patient support device of Fig. 1 showing that the support attachment includes a support bracket and a bottom-loading catch assembly including a pair of catch holds that define a receptacle for receiving the connector of the

patient support top;

Fig. 25 is an exploded perspective view of a catch hold of the catch assembly of the support attachment of Fig. 24 showing each catch hold including a housing that receives a receiver and defines the receptacle and a slot, and a locking catch including an arm that is axially aligned with the slot, the locking catch being operable to rotate within the receiver to selectively align the angular position of the arm to block the slot and prevent removal of the connection tube from the receptacle or to misalign the arm with the slot to allow the connection tube to pass through the slot;

Fig. 26 is a perspective view of the catch assembly of Figs. 24 and 25 showing the locking catches misaligned with the slot to allow the connection tube to pass through the slot;

Fig. 27 is perspective view of the catch assembly of Fig. 26 showing the connection tube received within the receptacle and the locking catches operated to align the arms with the slot to block removal of the connection tube from the receptacle;

Fig. 28 is a perspective view of another support attachment adapted for use with the patient support system of Fig. 1 showing a support bracket coupled to the mounting bar of the tower base and a catch assembly for connection to the patient support top and showing the support bracket including bracket rails having a tilt section for connecting the support bracket to the mounting bar and a tilt assembly for permitting pivoting of the support bracket while it is attached to the mounting bar to assist connection of the catch assembly with the patient support;

Fig. 29 is a closer perspective view of the tilt section of the support attachment of Fig. 28 showing the tilt section including a locking pin assembly for selectively connecting the support bracket to the mounting bar and a safety latch assembly for selectively restraining operation of the locking pin assembly to prevent unintended disengagement between the support bracket and the mounting bar, showing a safety pin of the safety latch assembly arranged in an unlatched position in which it is depressed into the bracket rail, and showing the safety pin translated to the left side of a pin slot of the safety latch assembly to remove a locking pin of the locking pin assembly from engagement with the mounting bar;

Fig. 30 is a perspective view of the tilt section of the support attachment, similar to Fig. 29, showing the safety pin in a latched position in which it is extended from the bracket rail to restrain the locking pin assembly from removal out of engagement with the mounting bar;

Fig. 31 is an exploded perspective view of the tilt section and the tilt assembly of the support attachment of Figs. 28-30 showing the tilt assembly including a pin latch that receives the safety pin therein for selective translation and reciprocation to latch and unlatch the locking pin assembly;

Fig. 32 is a perspective view of another embodiment of a support attachment adapted for use with the patient support showing that a tilt assembly includes a rotation lock assembly includes a handle for selectively locking and unlocking the support bracket for pivoting while remaining securely connected with the mounting bar;

Fig. 33 is a perspective view of an enlarged portion of the support attachment of Fig. 32 showing that the handle is positioned in the locked position;

Fig. 34 is a perspective view of an enlarged portion of the support attachment of Figs. 32 and 33 showing that the handle is positioned in the unlocked position;

Fig. 35 is a perspective view of an enlarged portion of the support attachment of Figs. 32-34 showing that the handle is positioned in the locked position and rendered transparent to show that a non-circular shaft is secured to the handle for rotation between corresponding locked and unlocked positions and that the shaft protrudes through a lockout slot of the support bracket which prevents pivoting of the support bracket when the handle is in the locked position;

Fig. 36 is a perspective view of an enlarged portion of the support attachment of Figs. 32-35 showing that the handle is positioned in the unlocked position and showing that the non-circular shaft has been rotated within the lockout slot to permit sliding (traversal) of the lockout slot relative to the shaft so that the support bracket may pivot when the handle is in the unlocked position;

Fig. 37 is an elevation view of the enlarged portion of the support attachment of Figs. 32-36 showing that the lockout slot includes a home portion to allow rotation of the non-circular shaft to the unlocked position and a pivot route portion which restricts acceptance of the shaft unless the shaft is arranged in the unlocked position; and

Fig. 38 is an elevation view of the enlarged portion of the support attachment of Fig. 37 showing that the shaft is in the unlocked position and the bracket rail has been pivoted (counter-clockwise) to traverse the pivot route portion around the shaft.

[0033] In performance of various surgical procedures, providing surgical access to surgery sites on a patient's body promotes favorable surgical conditions and increases the opportunity for successful results. Patient support devices can assist in positioning the patient's body to provide a surgical team preferred and/or appropriate access to particular surgical sites. Patient supports devices can include patient support tops which are supported above the floor by support structures. Selective attachment of patient support tops to the support structures enables the use of a variety of support tops and promotes ease of mobility and storage of the patient support devices.

[0034] An illustrative embodiment of a patient support

system 10 includes a pair of end supports, such as illustrative tower bases 12, a patient support top 14, and a pair of support attachments 16 each connected to the tower bases 12. The support attachments 16 are configured to selectively connect to the patient support top 14 to support the top 14 above the floor as shown in Fig. 1. At each longitudinal end, the patient support top 14 illustratively includes a coupler assembly 18 having a connection tube 20 for selective connection with a catch assembly 22 of each support attachment 16.

[0035] As best shown in the illustrative embodiment of Fig. 2, each support attachment 16 illustratively includes the catch assembly 22 and a support bracket 24 connected with the tower base 12 and extending from the tower base 12 along a length /. The catch assembly 22 illustratively couples to the support bracket 24 for selective positioning along the length / of the support bracket 24. The catch assembly 22 locks in place at discrete, spaced locations, along the length / of support bracket 24. The catch assembly 22 receives the connection tube 20 for selective connection of the patient support top 14 with the tower base 12 as shown in Figs 1-4.

[0036] An example of an acceptable coupler assembly 18 is disclosed in U.S. Patent Application Publication No. 2013/0269710 to Hight et al., including the descriptions and figures related to the motion coupler "218" and related features disclosed therein. In some embodiments, the patient support top 14 may be connected to the support attachment 16 in any suitable manner.

[0037] As best shown in Figs. 3 and 4, the catch assembly 22 is illustratively embodied as a top-loading catch assembly operable to selectively secure the patient support top 14 with the tower bases 12. The catch assembly 22 illustratively includes a pair of catch holds 28 each defining a catch receptacle 30 for receiving the connection tube 20. Each of the pair of catch holds 28 include a latch assembly 32 having a retractable latch 34. The latch 34 is pivotably connected to the respective catch hold 28 and is manually operable between an unlatched position (retracted position, shown in solid line in Fig. 3) and a latched position (extended position, shown in broken line in Fig. 3 and in solid line in Fig. 4) for blocking removal of the connection tube 20 from the catch receptacle 30.

[0038] Each catch hold 28 includes a catch body 36 and a catch arm 38 that extends from the catch body 36 to form the catch receptacle 30. Each catch arm 38 includes a top surface 40 that defines the catch receptacle 30 and engages with the connection tube 20. The top surface 40 of the catch arm 38 is illustratively formed to have a U-shape that is complimentary to the shape of the connection tube 20 and such that the catch receptacle 30 has an open top 42 for insertion of the connection tube 20. In some embodiments, the catch arm 38 and the connection tube 20 may have any suitable shapes complimentary to each other for selective connection.

[0039] As shown best in Fig. 5, each catch hold 28 illustratively comprises a carriage 44 and a cover 46 that together form each of the catch body 36 and the catch arm 38. In the illustrative embodiment, each carriage 44 includes a catch body portion 36a and a catch arm portion 38a extending from a side of the catch body portion 36a and defining a top surface 40a, and each cover 46 includes a catch body portion 36b and a catch arm portion 38b extending from a side of the catch body portion 36a and defining a top surface 40b. The catch body 36 illustratively comprises the catch body portions 36a, 36b, the catch arm 38 illustratively comprises the catch arm portions 38a, 38b, and the top surface 40 illustratively comprises the top surface portions 40a, 40b.

[0040] In the illustrative embodiment as shown in Fig. 5, the carriage 44 illustratively includes a flange 48 extending in a direction perpendicular to the catch arm portion 38a for connection with the support bracket 24. The cover 46 is illustratively attached to the carriage 42 opposite the flange 48 to enclose the latch assembly 32 within an interior cavity 49 defined in the carriage 42. The carriage 44 illustratively includes a latch opening 50 defined therein on the side of the catch body portion 36a of the carriage 44 from which the catch arm portion 38a extends and connected to the interior cavity 49. When the latch 34 of the latch assembly 32 is pivoted into the latched position, the latch 34 extends through the latch opening 50 to engage the connection tube 20.

[0041] The latch assembly 32 illustratively includes the latch 34, a resilient member embodied as a torsion spring 52 disposed to bias the latch 34 into the latched position, and a pivot pin 54 for pivotably attaching the latch 34 to the catch body 36. The pivot pin 54 extends through a pin hole 63 of the latch 34 along a pivot axis 56 thereof and is supported on opposite ends by each of the carriage 44 and the cover 46. The latch 34 is illustratively attached to the catch hold 28 by the pivot pin 54 for pivoting about the axis 56 between the latched and unlatched positions.

[0042] As shown in Fig. 5, the latch 34 illustratively includes a stem 60 extending between a pivot end 62 and a free end 64, and a tab 66 extending from the stem 60 in a direction parallel to the plane of pivoting of the latch 34 about the axis 56. The stem 60 at the pivot end 62 includes the pin hole 63 penetrating therethrough for receiving the pivot pin 54. The tab 66 illustratively forms a wedged-shape and includes an upper surface 68 that is sloped relative to the stem 60 and a lower surface 70 for engaging the connection tube 20 to block removal from the catch receptacle 30.

[0043] Returning to Fig. 3, the spring 52 normally biases the latch 34 into the latched position. When the connection tube 20 passes through the open top 42 of the catch receptacle 30, the connection tube 20 contacts the upper surface 68 of the tab 66 and forces the latch 34 into the unlatched position compressing the spring 52. The upper surface 68 is illustratively inclined to translate the downward force of the connection tube 20 pressing thereon into a lateral force (pivotal force) depressing the latch 34 into the unlatched position. Once the connection tube 20 has cleared the open top 42 and is received in

the catch receptacle 30, the spring 52 returns the latch 34 into the latched position.

[0044] In the latched position of the latch 34, the tab 66 protrudes through the latch opening 50 and extends at least partly across the open top 42 of the catch receptacle 30. When the connection tube 20 is received in the catch receptacle 30 and the latch 34 is in the latched position, the lower surface 70 of the tab 66 can engage the connection tube 20, as shown in Fig. 4, to block removal of the connection tube 20 from the catch receptacle 30. The lower surface 70 is illustratively inclined such that contact with the connection tube 20 is radially directed towards the pivot end 62 of the latch 34 to inhibit upward force from depressing the latch 34 into the unlatched position. However, a user can operate the free end 64 of the stem 60 of the latch 34 to manually compress the spring 52 and place the latch 34 into the unlatched position to permit removal of the connection tube 20 from the catch receptacle 30.

[0045] Referring to Figs. 6 and 7, as mentioned above, the catch assembly 22 is coupled to the support bracket 24 for slidable positioning. The catch assembly 22 illustratively includes a pawl 72 for selectively engaging teeth 76 of a ratchet 74 of the support bracket 24 at various discrete positions along the support bracket 24. The pawl 72 is biased by a spring member 80 into an engaged position between the teeth 76 of the ratchet 74 to prevent movement between the catch assembly 22 and the support bracket 24. The catch assembly 22 illustratively includes a lever 82 that is manually pivotable to force the pawl 72 into a disengaged position, out from between the teeth 76, thereby compressing the spring member 80 and releasing the catch assembly 22 for sliding movement along the support bracket 24 between the ends 90, 92 of the bracket rails 88. In the illustrative embodiment as shown in Fig. 7, the ratchet 74 is disposed within a cavity 84 defined in the support bracket 24.

[0046] In the illustrative embodiments as shown in Fig. 6, each support bracket 24 is attached to the respective tower base 12 by connection with a mounting bar 86 of the respective tower base 12. Each support bracket 24 illustratively includes a pair of bracket rails 88 spaced apart from each other and extending for a length / parallel each other between opposite ends 90, 92, and a bracket strut 91 extending between the bracket rails 88 at each of their opposite end 92. An example of an acceptable mounting bar 86 is disclosed in U.S. Patent Application Publication No. 2013/0269710 to Hight et al., at least including the descriptions and figures related to the connection block "283" and related features disclosed therein. In some embodiments, each support bracket 24 may be connected to the respective tower base 12 in any suitable manner.

[0047] In the illustrative embodiments as shown in Fig. 8, each bracket rail 88 includes a tilt section 94 for connecting the support brackets 24 to the mounting bar 86. The tilt section 94 illustratively includes a face 97 facing perpendicular to the extension direction of the bracket rail 88. On the tilt section 94, each bracket rail 88 includes a locking pin assembly 98 and a retainer slot 100 defined in an interior surface 102 of the respective bracket rail 88. In the illustrative embodiment, each retainer slot 100 is defined in the interior surface 102 for a length extending from the face 97 at an angle α relative to the extension length of the respective bracket rail 88, the angle α illustratively being less than 90 degrees (for example, about 45-85 degrees) to prevent undesired disengagement from the mounting bar 86. Each locking pin assembly 98 includes a locking pin 104 slidably mounted in a pin hole 106 extending through the respective bracket rail 88 and connected to a handle 109 for user operation. A user can selectively operate each locking pin assembly 98 by applying force to the respective handle 109 to slide the locking pin 104 between a retracted position (Fig. 8, shown in solid line, and suggested in Fig. 9) and an extended position (Fig. 8, shown in dotted line; and suggested in Fig. 10).

[0048] As shown in Fig. 8, each mounting bar 86 is illustratively attached to the tower base 12 by a rod 85 (the rod 85 being operable for rotation and translation by the tower base 12 to position the support bracket 24 accordingly, for example as disclosed within U.S. Patent Application Publication No. 2013/0269710 by Hight et al., at least including the descriptions and figures related to the shaft "212" and related features disclosed therein). Each mounting bar 86 illustratively includes a mounting body 107 extending for a length between opposite ends 108, 110 and two retainer pins 112 extending from each of the opposite ends 108, 110 parallel to the direction of extension of the mounting body 107. Each mounting bar 86 includes a pair of locking holes 114 defined in the opposite ends 108, 110. Each retainer pin 112 is configured for insertion within one of the retainer slots 100 of a respective bracket rail 88, and each locking hole 114 is configured to receive the locking pin 104 of the same respective bracket rail 88 therein for connection of the support bracket 24 to the mounting bar 86.

[0049] As suggested in Figs. 9 and 10, the angle α between the retainer slots 100 and the bracket rails 88 prevents accidental disconnection of the support bracket 24 from the mounting bar 86. To attach the support bracket 24 to the mounting bar 86, a user angles the support bracket 24 and aligns the retainer slots with the 100 retainer pins 112. The user moves the locking pins 104 into the retracted position and pivots the support bracket 24 in the direction indicated by arrows 115 in Fig. 8 to seat the retainer pins 112 within the retainer slots 100 and to align the locking pins 104 with the locking holes 114. Once aligned, as shown in Fig. 10, the user moves the locking pins 104 into the extended position for insertion into the locking holes 114. To remove the support bracket 24, a user reverses the steps mentioned above.

[0050] Referring now to Figs. 11 and 12, the support bracket 24 includes a tilt assembly 118 for pivoting the support bracket 24 while the support bracket 24 is attached to the mounting bar 86 to assist connection of the

catch assembly 22 with the patient support top 14. The tilt assembly 118 illustratively includes a pair of release gates 120, one of which is pivotably attached to the end 90 of each bracket rail 88 and forming a portion of the tilt section 94 of the respective bracket rail 88. The tilt assembly 118 provides selective pivoting of the support bracket 24 relative to the mounting bar 86 while attached to the mounting bar 86 to permit ease in connecting the patient support top 14 to the support bracket 24, as contrasted with the tilt section 94 that allows pivoting articulation of the support bracket 24 relative to the mounting bar 86 during attachment of these components (support bracket 24 and mounting bar 86) together.

[0051] As shown in Figs. 11 and 12, the release gates 120 of the tilt assembly 118 illustratively each include a frame 122 providing the interior surface 102 of the respective bracket rail 88 that defines the retainer slot 100 therein and a stopper 124 that extends from the frame 122 on an opposite side from the interior surface 102. The stopper 124 illustratively includes a surface 130 facing generally downward in Figs. 11 and 12 and shaped to define a rabbet 128 of the release gate 120 that is complimentary to the respective bracket rail 88 at the end 90. Each release gate 120 has a bolt hole 129 extending therethrough for fixing the relative positions of the release gates 120 and the bracket rails 88.

[0052] As shown in Figs. 11 and 12, each bracket rail 88 illustratively includes a merlon 132 that extends from the end 90 of the respective bracket rail 88 for joining within the rabbet 128 of the respective release gate 120. Each bracket rail 88 includes a surface 134 shaped complimentary to the surface 130 of the stopper 124 for engagement therewith when the merlon 132 is joined within the rabbet 128. In the illustrative embodiment shown in Figs. 11 and 12, the surfaces 130, 134 are curved, but in some embodiments may have any suitable complimentary shape.

[0053] In the illustrative embodiment shown in Figs. 11 and 12, each bracket rail 88 of the support bracket 24 is pivotably connected to one of the release gates 120 by a pin 135 for pivoting between a disconnection position (as shown in Fig. 11) and a connection position (as shown in Fig. 12). The merlon 132 of each bracket rail 88 illustratively includes a bolt latch 136 that is positionable between a disconnected position that does not extend from the merlon 132 for reception within the bolt hole 129 of the release gate 120 (as shown in Fig. 11) and a connected position (as shown in Fig. 12) in which the bolt latch 136 extends from the merlon 132 into the bolt hole 129 of the release gate 120 to releasably fix the bracket rails 88 against pivoting relative to the release gates 120.

[0054] The bolt latch 136 illustratively includes a bolt 138 slidably disposed in a bolt opening 140 of the merlon 132. In the illustrative embodiment, in the disconnected position each bolt 138 is positioned within the respective merlon 132 (i.e., not within the bolt hole 129) and the bracket rails 88 can pivot relative to the release gates 120. In the connected position, the bolts 138 project from the merlons 132 into the bolt holes 129 of the release gates 120. When the support bracket 24 is in the connection position (as shown in Fig. 12) and the bolt 138 is in the connected position, the bolt 138 extends into the bolt hole 129 of the respective release gate 120, fixing the position of the bracket rails 88 of the support bracket 24 for pivoting relative to the release gate 120. A user can operate the bolt latches 136 into the disconnected position out of the bolt holes 129 to release the pivoting motion of the support bracket 24 for connection and disconnection of the coupler assembly 18 of the patient support top 14 with the support bracket 24.

[0055] In Figs. 13-21 another illustrative embodiment of support attachments 1016 adapted for use in the patient support device 10 is shown. The support attachments 1016 are similar to the support attachments 16 as disclosed herein. Accordingly, the description of the support attachments 16 illustratively applies to the support attachments 1016, except in instances of conflict with the specific disclosure of the support attachments 1016.

[0056] Each support attachment 1016 illustratively connects with the mounting bar 86 of one of the tower bases 12 and is configured to selectively connect with the patient support top 14. Each support attachment 1016 illustratively includes a catch assembly 1022 slidably attached to a support bracket 1024 and selectively positionable along the length / of the support bracket 1024. The catch assembly 1022 locks at discrete, spaced positions along the length / of the support bracket 1024. The catch assembly 1022 of each support attachment 1016 is illustratively embodied as a top-loading catch assembly operable to selectively secure the patient support top 14 with the tower bases 12.

[0057] As best shown in Figs. 13 and 14, the catch assembly 1022 illustratively includes a main body 1027 and a pair of catch holds 1026 extending from the main body 1027 in spaced apart relation from each other. A user can manually operate the main body 1027 to selectively fix the position of the catch assembly 1022 along the length / of the support bracket 1024. The pair of catch holds 1026 extend from the main body 1027 to define a catch receptacle 1030 for receiving the connection tube 20. As best shown in Fig. 19, the catch receptacle 1030 illustratively includes the space which the connection tube 20 occupies while received by the catch assembly 1022.

[0058] As shown in Figs. 13 and 14, the catch assembly 1022 illustratively includes a latch assembly 1032 having pivotable latches 1034. In the illustrative embodiment, one of the latches 1034 is pivotably connected to each respective catch hold 1026. The latches 1034 are illustratively operable between an unlatched position (as shown in Fig. 13) for receiving insertion of the connection tube 20 into the catch receptacle 1030 and a latched position (as shown in Fig. 14) for blocking removal of the connection tube 20 from the catch receptacle 1030.

[0059] As shown in Fig. 15, each catch hold 1026 illustratively includes a catch body 1036 and a catch arm

1038 that extends from the catch body 1036 to form the catch receptacle 1030. The catch arm 1038 illustratively extends from the catch body 1036 at a location away from the main body 1027 of the catch assembly 1022 and extends vertically (in the orientation shown in Fig. 15) to define a portion of the catch receptacle 1030.

[0060] In the illustrative embodiment shown in Figs. 15 and 16, each catch body 1036 includes a top surface 1040 and each catch arm 1038 includes a side surface 1041. The corresponding top surface 1040 and side surface 1041 of a respective catch hold 1026 together define portions of the catch receptacle 1030 and engage with the connection tube 20 when received within the catch receptacle 1030. The catch body 1036 illustratively attaches to the main body 1027 at a location proximate to a side1037 of the catch assembly 1022.

[0061] As shown in Figs. 15 and 16, the main body 1027 includes a front surface 1042 that collectively defines, together with the corresponding top surface 1040 and side surface 1041 of each respective catch hold 1026, the catch receptacle 1030 to generally have a U-shape that is complimentary to the shape of the connection tube 20 and such that the catch receptacle 1030 has an open top 1044 for insertion of the connection tube 20. In some embodiments, the catch receptacle 1030 may be defined to have any suitable shape for receiving the connection tube 20.

[0062] As mentioned above, in the illustrative embodiment shown in Figs. 15 and 16, the latches 1034 of the respective latch assembly 1032 are pivotably attached to an interior side 1033 of the catch body 1036. Each latch 1034 illustratively includes a base 1046 formed of a plate and an arm 1048 that extends from the base 1046 to define a latch receptacle 1050. The base 1046 together with the arm 1048 include a continuous surface 1049 that defines the latch receptacle 1050.

[0063] In the illustrative embodiment, the arm 1048 of each latch 1034 illustratively includes a stem 1052 connected to the base 1046 and an arc 1054 attached to the stem 1052. The stem 1052 extends from a first end connected to the base 1046 vertically (in the orientation as shown Figs. 15 and 16) to a second end that is opposite the first end. The stem 1052 illustratively includes an interior surface 1053 that defines a portion of the surface 1049.

[0064] As shown in Fig. 16, the arc 1054 is illustratively connected to the second end of the stem 1052 opposite the base 1046 and extends from the stem 1052 to a free end 1056. The arc 1054 illustratively includes an interior surface 1058 that forms a portion of the surface 1049. The interior surface 1058 of the arc 1054 is formed to have a concave shape complimentary to the shape of the connection tube 20.

[0065] In the illustrative embodiment shown in Figs. 15 and 16, the interior surface 1053 of the stem 1052, the interior surface 1058 of the arc 1054, and a top surface 1051 of the base 1046 collectively form the continuous surface 1049. In the illustrative embodiment, the top surface 1051 of the base 1046 is arranged parallel to the top surface 1040 of the catch body 1036 and the interior surface 1053 of the stem 1052 is arranged parallel to the side surface 1041 of the catch body 1036.

[0066] As shown in Fig. 14, when the latch 1034 is in the latched position, the top surface 1051 of the base 1046 is aligned with the top surface 1040 of the catch body 1036 to form a continuous bottom surface and the interior surface 1053 of the stem 1052 is aligned with the side surface 1041 of the catch arm 1038 to form a continuous side surface. In the latched position, the arc 1054 of the latch 1034 is positioned to extend at least partly across the open top 1044 to block removal of the connection tube 20 from the catch receptacle 1030. As shown in Fig. 13, when the latch is in the unlatched position, the top surface 1051 of the base 1046 is out of alignment with the top surface 1040 of the catch body 1036 and the interior surface 1053 of the stem 1052 is out of alignment with the side surface 1041 of the catch arm 1038.

[0067] Connection of the patient support top 14 with the catch assembly 1022 is illustratively shown in Figs. 17-19. In Fig. 17, the catch assembly 1022 is illustratively arranged to accept the connection tube 20 of the patient support top 14 within the catch receptacle 1030. The latches 1034 are illustratively arranged in the latched position prior to engagement between the catch assembly and the patient support top 14. In Fig. 18, the connection tube 20 illustratively contacts the latches 1034 of the catch assembly 1022. The connection tube 20 illustrative contacts the arc 1054 of each latch 1034 and rotates the latches 1034 against a biasing member into the unlatched position as the connection tube 20 passes through the open top 1044 for reception within the catch receptacle 1030. In the illustrative embodiment, top surfaces 1055 (shown in Figs. 15 and 16) of the arcs 1054 are sloped to encourage the latches 1034 into the unlatched position upon contact by the connection tube 20. The interior surfaces 1058 of the arcs 1054 are illustratively not sloped such that upward force from the connection tube 20 is radial to the pivot point of the latches 1034, inhibiting unlocking by upward force alone. Once the connection tube 20 is received within the catch receptacle 1030, the latches 1034 are illustratively biased into the latched position to block removal of the connection tube 20 out of the catch receptacle 1030 as shown in Fig. 19.

[0068] Referring to Figs. 20 and 21, as mentioned above, the catch assembly 1022 is coupled to the support bracket 1024 for slidable positioning. The catch assembly 1022 illustratively includes a pawl assembly 1070 including a pair of pawls 1072 for selectively engaging teeth 1076 of ratchets 1074 of the respective bracket rail 1088 of the support bracket 1024 at various discrete positions along the support bracket 1024. The pawls 1072 are biased by a spring member 1078 into an engaged position (as shown in Fig. 20) between consecutive teeth 1076 of the ratchet 1074 to prevent relative movement be-

tween the catch assembly 22 and the support bracket 24 and are manually operable by a user into a disengaged position (as shown in dashed line in Fig. 23) out from between the teeth 76 to permit sliding of the catch assembly 1022 along the length / of the support bracket 1024.

[0069] As best shown in Fig. 16, each pawl 1072 illustratively includes a pawl lever 1080 having a pivot end 1082 and a free end 1084 opposite the pivot end 1082, and a pawl head 1086 that extends from the pawl lever 1080 proximate to the free end 1084 for selective engagement with the teeth 1076 of the respective bracket rail 1088 (as shown in Fig. 21). The pivot end 1082 illustratively receives a rod 1083 therethrough that is mounted for rotation with main body 1027 and to which the pawl lever 1080 and a trigger 1092 are fixed for rotation therewith. The pawl head 1086 is illustratively formed to have a triangular shape, but in some embodiments may have any suitable shape for engagement with the teeth 1076 to prevent unintentional disengagement as described herein. In some embodiments, a single pawl and ratchet may be used.

[0070] As shown in Figs. 20 and 21, the ratchet 1074 of the support bracket 1024 receives the pawl 1072 to provide selective anchoring of the catch assembly 1022 along the length / of the support bracket 1024. The teeth 1076 of each ratchet 1074 are illustratively disposed within the respective bracket rail 1088 of the support bracket 1024 and are arranged consecutively along the length / of the bracket rail 1088.

[0071] As shown in Figs. 22 and 23, the catch assembly 1022 illustratively includes a trigger 1092 pivotable to rotate the pawl 1072 about its pivot end 1082 between an engaged position (engaged with the teeth 1076, as shown in Fig. 21) and a disengaged position (out from engagement with the ratchet 1074, as shown in Fig. 23) compressing the spring member 79 and releasing the catch assembly 22 for sliding movement along the support bracket 24. The trigger 1092 is connected at one end to a rod 1083 that is attached to the pawl lever 1080 at the pivot end 1082 to transfer rotational force therebetween. The teeth 1076 of the ratchet 1074 are illustratively disposed within a cavity 1094 defined in the support bracket 1024.

[0072] In the illustrative embodiment, the triangular shape of the pawl head 1086 and the pivoting path of the pawl lever 1080 about the pivot end 1082 prevent the removal of the pawl 1072 from the ratchet 1074 without unloading the weight on the catch assembly 1022 as shown in Fig. 21. A user can apply force to the grips 1090 to unload the weight on the catch assembly 1022 to float the pawl head 1086 between the teeth 1076 of the ratchet 1074 and apply force to the trigger 1092 to rotate the pawl 1072 out of engagement with the ratchet 1074 to release the catch assembly 1022 for sliding movement along the support bracket 1024 as shown in Fig. 22. The user can select a relative positon of the catch assembly 1022 and release the trigger 1092 to allow the spring to bias the pawl 1072 into engagement with the teeth 1076 at the corresponding position, preventing relative movement between the catch assembly 1022 and the support bracket 1024.

[0073] As shown in Fig. 21, the teeth 1076 each illustratively include a flat surface 1077 and a curved surface 1079 disposed on opposite sides thereof. In the illustrative embodiment, the curved surfaces 1079 of each tooth 1076 face downward and the flat surfaces 1077 face upward in the orientation shown in Fig. 21. The teeth 1076 are illustratively arranged in a consecutive line within the cavity 1094 in spaced apart arrangement from the adjacent teeth 1076 to define a pawl space 1081 therebetween for receiving the pawl head 1086. The pawl head 1086 is blocked from removal from the pawl space 1081 when engaged with either of the flat or curved surfaces 1077, 1079 according to the rotational path of the pawl head 1086 and/or the corresponding shapes of the pawl head and surfaces 1077, 1079. Thus, requiring unloading of weight and slight centering of the pawl heat 1086 within the pawl space 1081 such that rotation of the pawl lever 1080 into the disengaged position does not cause contact between the pawl head 1086 and the surfaces 1077, 1079 inhibits unintentional sliding of the catch assembly 1022 relative to the support bracket 1024.

[0074] Figs. 24-27 show another illustrative embodiment of a pair of support attachments 2016 adapted for use in the patient support device 10. The support attachments 2016 are similar to the support attachments 16, 1016 as disclosed herein. The description of the support attachments 16, 1016 apply to the support attachments 2016, except in instances of conflict with the specific disclosure of the support attachments 2016.

[0075] Each support attachment 2016 illustratively connects with the mounting bar 86 of one of the tower bases 12 and is configured to selectively connect with the patient support top 14. Each support attachment 2016 illustratively includes a catch assembly 2022 slidably attached to a support bracket 2024. The catch assembly 2022 of each support attachment 2016 is illustratively embodied as a bottom-loading catch assembly operable to selectively secure the patient support top 14 with the tower bases 12.

[0076] As shown in Fig. 24, each catch assembly 2022 illustratively includes a pair of catch housings 2026 and a locking catch 2028 disposed for rotation within each catch housing 2026. Each catch housing 2026 defines a catch receptacle 2030 embodied as an internal space therein for insertion of the connection tube 20 and a slot 2032 extending radially between the catch receptacle 2030 and an exterior wall 2034 of the catch housing 2026. The slot 2032 is illustratively embodied as a passage through which the connection tube 20 can enter into the catch receptacle 2030. With the connection tube 20 received within the catch receptacle 2030, a user can manually rotate the locking catch 2028 into position to impede the slot 2032 to prevent removal of the connection tube 20 from the catch receptacle 2030.

[0077] As best shown in Fig. 25, each catch housing 2026 illustratively includes a housing cover 2036 having a cavity 2040 defined therein and a housing receiver 2042 positioned within the cavity 2040. The housing cover 2036 illustratively includes a body 2035 having an interior surface 2038 that defines the cavity 2040 and a closure 2037 that attaches to the body 2035 to secure the housing receiver 2042 within the cavity 2040.

[0078] The housing receiver 2042 is illustratively embodied to as a hollow tube including a tube wall 2043 extending longitudinally along an axis 2025 to define an interior space 2045 and having exterior surfaces 2044 disposed opposite each other for engagement with the housing cover 2036. The cavity 2040 is illustratively shaped complimentary to the shape of the housing receiver 2042 to permit the housing receiver 2042 to translate within the cavity 2040 relative to the housing cover 2036 along the vertical direction in the orientation as shown in Fig. 25. The exterior surfaces 2044 of the housing receiver 2042 are illustratively flat surfaces that engage with the interior surface 2038 of the housing cover 2036 to prevent rotation of the housing receiver 2042 relative to the housing cover 2036. Allowing the housing receiver 2042 to translate, but not rotate, relative to the housing cover 2036 provides security against accidental release of the connection tube 20 from the catch receptacle 2030, as explained in detail below.

[0079] In the illustrative embodiment as shown in Fig. 25, each locking catch 2028 is rotatably received within the interior space 2045 of the respective housing receiver 2042 and fixed against vertical translation relative thereto. Each locking catch 2028 illustratively includes a body 2046 illustratively formed as a cylinder extending longitudinally along the axis 2025 and an arm 2048 that extends from the body 2046 for a length in the direction of the axis 2025. The arm 2048 is illustratively embodied as a wall formed circumferentially around the axis 2025 and having circumferential ends 2050, 2052 that define a gap 2054 therebetween. The locking catch 2028 are illustratively positioned within the catch hold 2026 such that the arm 2048 and the gap 2054 of the locking catch 2028 are axially aligned with the slot 2032 of the catch housing 2026. A user can rotate the locking catch 2028 about the axis 2025 to circumferentially (angularly) align either the arm 2048 or the gap 2054 with the slot 2032 of the catch housing 2026 to selectively unlock and lock the catch assembly 2022.

[0080] A user can selectively rotate the locking catch 2028 between an unlocked position (as shown in Fig. 26) in which the gap 2054 is circumferentially aligned with the slot 2032, and a locked position (as shown in Fig. 27) in which the arm 2048 is circumferentially aligned with the slot 2032. In the unlocked position, as shown in Fig. 26, the arm 2048 is illustratively positioned at an angular position about the axis 2025 different from the angular position of the slot 2032 to permit passage of the connection tube 20 upwardly through the slot 2032 and into the catch receptacle 2030. In the unlocked position, as suggested in Fig. 27, the arm 2048 is illustratively positioned at an angular position about the axis 2025 corresponding to the angular position of the slot 2032 to impede the connection tube 20 from passing through the slot 2032. When the connection tube 20 is within the catch receptacle 2030 and the locking catch 2028 is in the locked position, the connection tube 20 is blocked against removal from the catch receptacle 2030.

[0081] Referring to Fig. 25, the catch assembly 2022 illustratively includes a security clutch 2058 that discourages accidental unlocking of the catch assembly 2022. The security clutch 2058 illustratively includes portions of the locking catch 2028 and the closure 2037 configured to interact with each other to require a user to unload the catch assembly 2022 (and, thus, to unload a connected patient support top 14) before permitting rotation of the locking catch 1028 out of the locked position.

[0082] In the illustrative embodiment, the locking catch 2028 illustratively includes a pair of posts 2056 that extend from an end of the body 2046 opposite the arm 2048. The posts 2056 are each illustratively connected to the body 2046 at different angular positions relative to the axis 2025 to exert leverage on the body 2046 in rotation about the axis 2025. The posts 2056 illustratively interact with the closure 2037 to provide the security clutch 2058.

[0083] The closure 2037 illustratively includes a closure body 2060 having fastener holes 2062 defined axially therethrough for receiving fasteners for attachment to the body 2046 and having an interior surface 2064 that defines a keyhole 2066 axially penetrating through the closure body 2060. The keyhole 2066 illustratively receives the posts 2056 of the locking catch 2028 for interaction with the interior surface 2064. The interior surface 2064 of the keyhole 2066 illustratively defines abutments 2068, 2069 and a crevice 2070.

[0084] The abutments 1068, 1069 are illustratively arranged at angular positions relative to each other and the posts 2056 such that engagement of one of the posts 2056 with the abutment 2068 defines an angular position of the locking catch 2028 that corresponds with the unlocked position and engagement of the other post 2056 with the abutment 2069 defines an angular position of the locking catch 2028 that corresponds with the locked position. The abutment 2069 and the crevice 2070 are each arranged at angular positions corresponding to the angular position of one of the posts 2056 about the axis 2025. In the illustrative embodiment, the abutments 2068, 2069 are positioned with a smaller radial distance from the axis 2025 than the crevice 2070.

[0085] When one of the posts 2056 is positioned in the crevice 2070, rotation of the locking catch 2028 relative to the housing cover 2036 is restricted. In the illustrative embodiment, the crevice 2070 is positioned at the 6 o'clock position as depicted in Fig. 25. When the catch housing 2026 is in the locked position, the weight of the catch housing 2026 (and the force transmitted by the connection tube 20 if present within the catch receptacle 2030) urges the post 2056 into the crevice 2070 restrict-

ing rotation of the locking catch 2028. Thus, when the catch housing 2026 is in the locked position, the weight of the patient support top 14 (including any load it supports, for example, a patient) that is connected to the catch assembly 2022 naturally inhibits the locking catch 2028 from being accidentally operated into the unlocked position. In order to rotate the locking catch 2028 out of the locked position, a user must lift the housing receiver 2042 vertically to translate the housing receiver 2042 relative to the housing cover 2036 to translate the post 2056 out of the crevice 2070, thereby releasing the locking catch 2028 for rotation. By arranging the force of the patient support top 14 to work in the direction to urge the post 2056 into the crevice 2070, the force of a patient occupying the patient support top 14 discourages accidental unlocking of the catch assembly 2022.

[0086] As shown in Fig. 25, each catch hold 1026 illustratively includes a lever 2072 fixed against rotation to a shaft 2074 of the locking catch 2028. Each catch housing 2026 illustratively includes a spring 2076 biasing the locking catch 2028 into the locked position. A user can operate the lever 2072 to transmit rotation to the locking catch 2028 via the shaft 2074 to oppose the force of the spring 2076 to rotate the locking catch 2028 into the unlocked position.

[0087] As shown in Fig. 26, a user rotates each locking catch 2028 into the unlocked position to receive the connection tube 20 to pass through the slot 2032 and into the catch receptacle 2030. As shown in Fig. 27, a user can move the connection tube 20 into the catch receptacle 2030 and release the levers 2072 to allow the springs 2076 to bias the locking catches 2028 into the locked position to block removal of the connection tube 20 from the catch receptacle 2030.

[0088] Another illustrative embodiment of support attachments 3016 adapted for use in the patient support device 10 is shown in Fig. 28-31. The support attachments 3016 are similar to the support attachments 16, 1016, 2016 as disclosed herein. The description of the support attachments 16, 1016, 2016 apply to the support attachments 3016 except in instances of conflict with the specific disclosure of the support attachments 3016.

[0089] As shown in Fig. 28, each support attachment 3016 illustratively connects with the mounting bar 86 of the tower bases 12 and is configured to selectively connect with the patient support top 14. Each support attachment 3016 illustratively includes a catch assembly 3022 slidably attached to a support bracket 3024 and selectively positionable along a length / of the support bracket 3024. The catch assembly 3022 of each support attachment 3016 is illustratively embodied as a top-loading catch assembly operable to selectively secure the patient support top 14 with the tower bases 12.

[0090] Each support bracket 3024 illustratively includes a pair of bracket rails 3088 spaced apart from each other and extending parallel to each other for the length /. In the illustrative embodiment as shown in Fig. 28, each bracket rail 3088 includes a tilt section 3094 having a lock pin assembly 3098 and a retainer slot 100 defined on an interior surface 102 thereof for attaching the support bracket 3024 to the mounting bar 86. Each retainer slot 100 is illustratively defined in the interior surface 102 for a length extending from a face 97 of the respective bracket rail 3088 at an angle relative to the extension length of the respective bracket rail 3088, the angle illustratively being less than 90 degrees to prevent undesired disengagement from the mounting bar 86.

[0091] As shown in Figs. 29 and 30, each lock pin assembly 3098 includes locking pin 3104 connected to a handle 3109 for user operation and slidably received in a pin hole 3106 that extends through a release gate 3120 of the respective bracket rail 3088 and is aligned with the locking hole 114 of the mounting bar 86. A user can selectively operate each lock pin assembly 3098 by applying force to the respective handle 3109 to slide the locking pin 3104 between a retracted position withdrawn from the locking hole 114 (as shown in Fig. 30) and an extended position inserted within the locking hole 114 (as shown in Fig. 29) to selectively attach the support bracket 3024 to the mounting bar 86.

[0092] As shown in Figs. 29 and 30, each lock pin assembly 3098 illustratively includes a safety latch assembly 3200 for selectively preventing removal of the locking pin 3104 out from the locking hole 114 of the mounting bar 86. Each safety latch assembly 3200 illustratively includes a safety pin 3210 and a pin slot 3212 defined by the bracket rail 3088 to receive the safety pin 3210 for reciprocation and translation therein. Each safety pin 3210 is illustratively slidably received within a hole 3211 of the respective handle 3109 and extends perpendicularly to the direction of the locking pin 3104 through the pin slot 3212. The safety pin 3210 is operable between an unlatched position (as shown in Fig. 29) in which the safety pin 3210 is depressed into pin slot 3212 of the bracket rail 3088 to allow translating movement of the locking pin 3104 and a latched position (as shown in Fig. 30) in which the safety pin 3210 extends from the pin slot 3212 and engages a latch receptacle 3224 defined therein (as described in detail below) to prevent removal of the locking pin 3104 from the locking hole 114 without depression of the safety pin 3104.

[0093] In the illustrative embodiment as shown in Fig. 31, the safety pin 3210 is embodied as a stepped shaft including a first section 3216 having a first diameter d_1 and a second section 3218 having a second diameter d_2 larger than the first diameter d_1 and defining a step 3220 extending between and connecting the first section 3216 with the second section 3218. The step 3220 illustratively selectively engages with the latch receptacle 3224 of the respectively release gate 3120 to prevent removal of the locking pin 3104 from the locking hole 114.

[0094] As shown in Fig. 28, the support attachments 3016 each illustratively include a tilt assembly 3118 for pivoting the support bracket 3024 while attached to the mounting bar 86 to assist connection of the catch assembly 3022 with the patient support top 14 (as discussed

below). The tilt assembly 3118 illustratively includes a pair of release gates 3120, one of each being pivotably connected to each bracket rail 3088 on a connection end thereof. The release gates 3120 illustratively provide the interior surface 102 of the respective bracket rail 3088 that defines the retainer slot 100 as described above regarding support bracket 24.

[0095] In the illustrative embodiment as shown in Fig. 30, the release gates 3120 illustratively define the pin slots 3212. Each pin slot 3212 illustratively includes a slide receptacle 3222 that is shaped to receive the safety pin 3210 for transverse movement (corresponding to the position of the respective handle 3109) therein and a latch receptacle 3224 connecting with the slide receptacle 3222 and shaped to receive the safety pin 3210 to block transverse movement of the safety pin 3210 within the slide receptacle 3222. In the illustrative embodiment, the slide receptacle 3222 is sized and shaped complimentary to the first section 3216 of the safety pin 3210 to receive the safety pin 3210 for transverse movement therein but is too small to receive the second section 3218 therein. The latch receptacle 3224 is illustratively sized and shaped complimentary to the second section 3218 of the safety pin 3210 to receive the second section 3218 therein for reciprocating movement along the direction of an axis 27 as shown in Fig. 31. The release gates 3120 each includes a latch wall 3228 disposed between the latch receptacle 3224 and the slide receptacle 3222 defining an end of the latch receptacle 3224 against which the step 3220 abuts when the safety pin 3210 is received within the latch receptacle 3224.

[0096] The safety latch assembly 3200 illustratively includes a biasing member (illustratively embodied as a spring) positioned within the hole 3211 and biasing the safety pin 3210 into the latched position. When the safety pin 3210 is aligned with the latch receptacle 3224, the biasing member 3230 biases the second section 3218 of the safety pin 3210 into the latched position within the latch receptacle 3224 to prevent translation of the safety pin 3210 within the pin slot 3212 and preventing removal of the lock pin 3106 from the respective locking hole 114 of the mounting bar 86. A user can depress the safety pins 3210 into their respective release gates 3120 to the unlatched position to remove the second section 3218 of the safety pin 3210 from the latch receptacle 3224 to allow translation of the safety pins 3210 along their respective pins slots 3212 and to release the locking pin 3104 for removal from the locking hole 114. The handle 3109 includes a cutout section 3232 having curvature complimentary to a user's hand to facilitate operation of the locking pin 3104. The safety latch assembly 3200 of the tilt assembly 3118 thus provides a safety mechanism requiring user operation (dual coordinated action) in order to disconnect the support bracket 3024 from the mounting bar 86.

[0097] In the illustrative embodiment as shown in Fig. 31, the tilt assembly 3118 allows selective pivoting of the support bracket 3024 while attached to the mounting bar 86 to assist connection of the catch assembly 3022 with the patient support top 14. The tilt assembly 3118 includes a pivot bolt 3135 pivotably connecting each bracket rail 3088 with its respective release gate 3120 and a pin 3136 for selectively preventing pivoting of the bracket rail about the pivot bolt 3135. Each pin 3136 is operable between a connection position (extended as indicated in broken line in Fig. 31) and a disconnection position similar (depressed as indicated in solid line in Fig. 31) to assist with connection and disconnection of the patient support top 14.

[0098] In the illustrative embodiment as shown in Fig. 31, the pin 3136 includes a first pin 3136a slidably disposed in a pin hole 3137a formed in the bracket rail 3088 and a second pin 3136b sildably disposed in a pin hole 3137b formed in the release gate 3120. The pins 3136a, 3136b and pin holes 3137a, 3137b are illustratively collinear (when the support bracket 3024 is in the connection position) and the pins 3136a, 3136b abut each other at their adjacent ends. When the pin 3136 is in the depressed position (as shown in solid line in Fig. 31) the pin 3136b is positioned wholly within the pin hole 3137b and not within the pin hole 3137a to release the tilt assembly 3118 to pivot the bracket rails 3088 about the pivot bolt 3135. When the pin 3136 is in the extended position (as shown in dotted line in Fig. 31) the pin 3136b is positioned partially within each of the pin holes 3137a, 3137b to prevent pivoting of the bracket rails 3088 about the pivot bolt 3135. A user can depress the 3136 to move the pin 3136 into the depressed position, and release the pin 3136 while the support bracket 3024 is in the connection position to allow the pin 3136 to be biased into the extended position.

[0099] As best shown in Fig. 30, the bracket rails 3088 and the respective handle 3109 define a gap 3244 therebetween to permit the bracket rails 3088 to pivot in the direction of arrows 3246 to assist connection with the patient support top 14. The support bracket 3024 can thus be pivoted away from the patient support top 14, similarly to support bracket 24, to facilitate connection with the patient support top 14.

[0100] Referring now to Figs. 32-36, another illustrative embodiment is shown of support attachments 4016 adapted for use in the patient support device 10. The support attachments 4016 are similar to the support attachments 16, 1016, 2016, 3016 as disclosed herein. The description of the support attachments 16, 1016, 2016, 3016 apply to the support attachments 4016, except in instance of conflict with the specific disclosure of the support attachments 4016.

[0101] As shown in Fig. 32, each support attachment 4016 is illustratively configured to selectively connect with the mounting bar 86 of one of the tower bases 12 and with the patient support top 14. Each support attachment 4016 illustratively includes a catch assembly 4022 slidably attached to a support bracket 4024 and selectively positionable along a length / of the support bracket 4024. The catch assembly 4022 of each support attach-

ment 4016 is illustratively embodied as a top-loading catch assembly operable to selectively secure the patient support top 14 with the tower bases 12.

[0102] Each support bracket 4024 illustratively includes a pair of bracket rails 4088 spaced apart from each other and extending parallel to each other along the length /. In the illustrative embodiment as shown in Fig. 32, each bracket rail 4088 includes a tilt section 4094 having a lock pin assembly 4098 and a retainer slot 100 defined on an interior surface 102 thereof for attaching the support bracket 4024 to the mounting bar 86. Each retainer slot 100 is illustratively defined in the interior surface 102 for a length extending from a face 97 of the respective bracket rail 4088 at an angle relative to the extension length of the respective bracket rail 4088, the angle illustratively being less than 90 degrees to prevent undesired disengagement from the mounting bar 86.

[0103] As shown in Fig. 32, each lock pin assembly 4098 illustratively includes a locking pin 4104 connected to a handle 4109 for user operation. The locking pin 4104 is slidably received in a pin hole 4106 that extends through a release gate 4120 of the respective bracket rail 4088 and is aligned with the locking hole 114 of the mounting bar 86. A user can selectively operate each lock pin assembly 4098 by applying force to the respective handle 4109 to slide the locking pin 4104 between a retracted position (withdrawn from the locking hole 114) and an extended position (inserted within the locking hole 114 as shown in Fig. 32) to selectively secure the support bracket 4024 to the mounting bar 86. Each lock pin assembly 4098 illustratively includes a safety latch assembly, embodied to be similar to safety latch assembly 3200, for selectively preventing removal of the locking pin 4104 out from the locking hole 114 of the mounting bar 86. The safety latch assembly 3200 can reduce the risk of inadvertent disconnection of the support attachment 4016 from the mounting bar 86.

[0104] As shown in Fig. 32, the support attachments 4016 illustratively include a tilt assembly 4118 for pivoting the support bracket 4024 while attached to the mounting bar 86 to assist connection of the catch assembly 4022 with the patient support top 14. The tilt assembly 4118 illustratively includes the pair of release gates 4120, one of each being pivotably connected to each bracket rail 4088 on a connection end thereof. The release gates 4120 illustratively provide the interior surface 102 of the respective bracket rail 4088 that defines the retainer slot 100 as described above regarding support brackets 24, 1024, 2024, 3024, 4024. As best shown in Fig. 34, the tilt assembly 4118 illustratively includes a pivot bolt 4135 that pivotably connects each bracket rail 4088 with its respective release gate 4120.

[0105] As described herein, with reference to Figs. 33 and 34, the tilt assembly 4118 illustratively includes a rotation lock assembly 4302 for selectively allowing pivoting of the support bracket 4024. The rotation lock assembly 4302 is selectively operable to release pivoting of the support bracket 4024 (namely, the bracket rail 4088) about the pivot bolt 4135. The rotation lock assembly 4302 illustratively includes a lock handle 4304 and a shaft 4306 secured with the lock handle 4304 to receive rotation by a user's hand.

[0106] The lock handle 4304 is operable between a locked position (as suggested in Fig. 33) and an unlocked position (as suggested in Fig. 34), and the shaft 4306 is arranged in correspondence. A user can selectively operate the lock handle 4304 into the locked position to place the shaft 4306 in a corresponding locked position to prevent pivoting of the bracket rail 4088 about the pivot bolt 4135, and into the unlocked position to place the shaft 4306 in a corresponding unlocked position to allow pivoting of the bracket rail 4088 about the pivot bolt 4135. Accordingly, the rotation lock assembly 4302 can operate to selectively release the support bracket 4024 for pivoting while secured by the tilt section 4094 with the mounting bar 86 of the tower base 12.

[0107] The lock handle 4304 illustratively includes a base 4308 and a stem 4310 that extends from the base 4308. The stem 4310 illustratively extends from the base 4308 with ergonomic form for grasping by a user's hand to apply leverage to the base 4308. The shaft 4306 is illustratively connected with the base 4308 and projects along an axis 4305, orthogonally relative to the rotation plane and the stem 4310.

[0108] As shown in Figs. 35 and 36, the shaft 4306 illustratively extends along the axis 4305 from the lock handle 4304 and penetrates through a slot 4312 of the respective bracket rail 4088 and through the respective release gate 4120. The shaft 4306 illustratively extends from the respective release gate 4120 along the axis 4305 to the other release gate 4120, penetrates through the other release gate 4120 and through the slot 4312 in the respective (other) bracket rail 4088, and connects with the base 4308 of the other lock handle 4304 (as best suggested in Fig. 32). In the illustrative embodiment, the shaft 4306 is rotatingly supported in place by each of the release gates 4120 to selectively rotate about the axis 4305 under actuation by the lock handle 4304. The shaft 4306 illustratively remains in place relative to the bracket rails 4088 during pivoting of the bracket rails 4088 about the pivot bolts 4135 as the slots 4132 traverse along the shaft 4306 as discussed in additional detail below.

[0109] As shown in Figs. 35 and 36, each slot 4132 illustratively defines curvature *R* formed complimentary to the pivoting motion of the support bracket 4024 about the pivot bolt 4135. When each lock handle 4304 is in the unlocked position, the support bracket 4024 can pivot (counter-clockwise in Fig. 36) by allowing each slot 4312 to accept the shaft 4306 to traverse along its curvature *R* relative. Description of traversal between the shaft 4306 and the slot 4312 refers to relative motion between the shaft 4306 and the slot 4312, and in the illustrative embodiment intends that while the shaft 4306 remains stationary, the support bracket 4024 is pivoted about the pivot bolt 4135 such that the slot 4312 moves along its curvature *R* relative to the shaft 4306. In some embodi-

ments, the shaft 4306 may pivot along with the support bracket 4024 and the slot 4312 may remain stationary. When either of the lock handles 4304 are in the locked position, the shaft 4306 cannot traverse the respective slot 4312 as discussed in additional detail below.

[0110] In the illustrative embodiment as shown in Figs. 37 and 38, the slot 4312 includes slot portions including a lock home 4314 and a pivot route 4316 extending from the lock home 4314 to define the curvature *R*. The shaft 4306 illustratively has an asymmetrical shape in cross-section along the axis 4305, embodied as a bean shape. The lock home 4314 is formed to permit rotation of the shaft 4306 about axis 4305, between the locked and unlocked positions, when the shaft 4306 is seated therein (as suggested in Figs. 35 and 36); and the pivot route 4316 is formed to allow traversal along the curvature *R*, but not rotation about axis 4305, of the shaft 4306, when the lock handle 4304 and the shaft 4306 are in the unlocked position.

[0111] In some embodiments, the shaft 4306 and slots 4312 may have any suitable shapes, sizing, and/or arrangement to restrict relative traversal of the shaft 4306 and the slot 4312, in certain angular positions of the shaft 4306 relative to the slot 4312, to prevent pivoting of the support bracket 4024 about the pivot bolt 4135; and to permit relative traversal of the shaft 4306 and the slot 4312, in certain other angular positions of the shaft 4306 relative to the slot 4312, to allow pivoting of the support bracket 4024 about the pivot bolt 4135. For example but without limitation, in some embodiments, the shaft 4306 may have a semi-circular cross-section and/or the lock home 4314 may be positioned intermediately along the curvature *R* of the pivot route 4316 to permit some degree of pivoting of the support bracket 4024 about the pivot bolt 4135 in either direction (clockwise and counter-clockwise) relative to the lock home 4314 position.

[0112] In the illustrative embodiment as shown in Figs. 37 and 38, the cross-section of the shaft 4306 defines a width *w* and a breadth *n*, the width *w* being larger than the breadth *n*. The lock home 4314 portion of the slot 4312 is illustratively sized to have a diameter greater than or equal to the width *w* to permit rotation of the shaft 4306 when seated within the lock home 4314. The pivot route 4316 is illustratively sized and/or shaped complimentary to the breadth *n* of the shaft 4306 to permit translation when the shaft 4306 is in the unlocked position, but is sized and/or shaped uncomplimentary to the width *w* of the shaft 4306 to prevent entry and translation of the shaft 4306 into the pivot route 4316 when the shaft 4306 is in the locked position. For example but without limitation, in some embodiments, the pivot route may be sized smaller than the width *w,* but greater than or equal to the breadth n to permit entry and translation of the shaft 4306 into the pivot route 4316 only when the shaft 4306 is in the unlocked position.

[0113] When the shaft 4306 is seated in the lock home 4314 and positioned in the locked position, as shown in Figs. 35 and 37, attempts to pivot the support bracket 4024 in the counter-clockwise direction are prevented by contact of the shaft 4306 with surfaces which define the slots 4312, namely, prohibitive contact with a transition edge portion 4320 formed between the lock home 4314 and the pivot route 4316. When the shaft 4306 is rotated into the unlocked position, as shown in Figs. 36 and 38, the breadth *n* of the shaft 4306 is aligned with the pivot route 4316 such that pivoting the support bracket 4024 does not incur prohibitive contact between the transition edge portion 4320 and the shaft 4306 allowing entry and translation of the shaft 4306 relative to the slot 4312 along the curvature *R* of the pivot route 4316, and thus allowing pivoting of the support bracket 4024.

[0114] Returning briefly to Figs. 33 and 34, the rotation lock assembly 4302 illustratively includes a wing 4322 for providing coordinated release prevention. The wing 4322 is formed as a sheet projecting from the lock handle 4304 (in the downward direction in the orientation of Fig. 33 and leftward in Fig. 34). The wing 4322 illustratively extends within the plane of rotation of the lock handle 4304 and provides an obstruction to operation of the tilt section 4094 to disconnect the support bracket 4024 from the mounting bar 86, at least upon unlocking of the tilt assembly 4118. Accordingly, in the illustrative embodiment, the wing 4322 is arranged to prevent disengagement of the tilt section 4094 while the tilt assembly 4118 is unlocked.

[0115] As shown in Fig. 34, when the lock handle 4304 is arranged in the unlocked position to permit pivoting of the support bracket 4024 about the pivot bolt 4135, the wing 4322 is illustratively arranged to block the handle 4109 of the tilt section 4094 from being placed into the retracted position (to the right in the orientation of Fig. 34, away from the bracket rail 4088). Thus, even under operation of the safety latch assembly 3200 to permit retraction the locking pin 4104 from engagement with the mounting bar 86, the wing 4322 obstructs this operation when the lock handle 4304 is in the unlocked position. As shown in Fig. 33, when the lock handle 4304 is in the locked position, the wing 4322 is clear of the movement of the handle 4109 into the retracted position (as shown in dashed line) to withdraw the locking pin 4104 from engagement with the mounting bar 86.

[0116] Likewise, as suggested in Fig. 33, upon operation of the handle 4109 to retract the locking pin 4104 from the mounting bar 86 (as shown in dashed line), the handle 4109 extends into plane of rotation of the lock handle 4304 preventing rotation of the lock handle 4304 into the unlocked position. Accordingly, the present embodiment can include arrangement to prevent unlocking of the tilt assembly 4118 while the tilt section 4094 is disengaged (locking pin 4104 in the retracted position).

[0117] Returning to Figs. 35 and 36, the rotation lock assembly 4302 illustratively includes a feedback system 4324 for communicating whether the lock handle 4304 is in the locked position. The feedback system 4324 illustratively includes a ball detent 4326 that is mounted into the bracket rail 4088 with spring-loading to resiliently

protrude from the bracket rail 4088 for engagement with the lock handle 4304. As best seen in Fig. 36, the lock handle 4304 illustratively includes a receiver 4328 formed concave and complimentary to the ball detent 4326, and arranged to receive the ball detent 4326 when the lock handle 4304 is in the locked position (as suggested in Fig. 35).

[0118] In the illustrative embodiment, the ball detent 4326 and the receiver 4328 are complimentary spherical to permit ramped sliding therebetween. When the ball detent 4326 is received within the receiver 4328, the spring-loading applies a force that must be overcome in order to depress the ball detent 4326 into the bracket rail 4088 to allow rotation of the lock handle 4304. Upon rotation of the lock handle 4304, a wedge action occurs between the receiver 4328 and the ball detent 4326 to depress the ball detent 4326 against the spring-loading and into the bracket rail 4088 to permit rotation of the lock handle 4304 towards the unlocked position. The release of the ball detent 4326 out of the receiver 4328 is communicated to the user; namely, the release can be felt by the operator's hand as a sudden relief of rotational resistance of the lock handle 4304. Similarly, rotation of the lock handle 4304 into the locked position causes alignment between the depressed ball detent 4326 such that the ball detent 4326 extends under spring-loading into the receiver 4328. The seating of ball detent 4326 into the receiver 4328 is communicated to the user as a feeling of sudden resistance to rotation of the lock handle 4304. Seating of the ball detent 4326 can provide slight resistance to unintentional rotation of the lock handle 4304 out of the locked position. In some embodiments, the ball detent 4326 and receiver 4328 may have any suitable complimentary shapes. The feedback system 4324 can provide communication of seating and unseating of the lock handle 4304 in the locked position and/or discourage unintentional movement of the lock handle 4304 out of the locked position.

[0119] The present disclosure includes interaction between complimentary and/or uncomplimentary features. In some embodiments, complimentary and/or uncomplimentary features can be reversed in position, have alternative and/or uncomplimentary shapes, respectively, and/or other arrangements forming suitable complimentary and/or uncomplimentary relationships, as appropriate. In some embodiments, the angle β of pivoting of the support bracket to facilitate receiving the attachment of the connector 20 with the catch assembly may be in the range of about 1 to about 35 degrees, and in some embodiments, about 15 degrees.

[0120] Although certain illustrative embodiments have been described in detail above, variations and modifications exist.

[0121] Embodiments of the invention can be described with reference to the following numbered clauses, with preferred features laid out in the dependent clauses:

1. A top-loading patient support device comprising:

a patient support top including a connector disposed at a longitudinal end thereof, an end support configured to support the patient support top,

a support bracket connected to the end support, and

a catch assembly attached to the support bracket for selectively receiving the connector of the patient support top, the catch assembly including a main body extending between opposite ends and a number of catch holds that extend from the main body, each of the catch holds including a catch body and a catch arm that extends from the catch body to define a receptacle having an open top for receiving the connector of the patient support top, the catch assembly including a latch assembly having a latch that is operable between a first position in which the latch is retracted from the open top of the receptacle and a second position in which the latch extends at least partly across the open top of the receptacle to block removal of the connector from the receptacle.

2. The top-loading patient support device of clause 1, wherein the latch is pivotably attached to a side of one of the catch holds.

3. The top-loading patient support device of either clause 1 or clause 2, wherein each catch body includes a top surface and each respective catch arm includes a side surface, the respective top and side surfaces of each catch hold together define at least a portion of the receptacle.

4. The top-loading patient support device of clause 3, wherein the latch includes a top surface and a side surface that together define a latch receptacle, and when the latch is in the second position, the top surface of the latch is aligned with the top surface of the catch body to form a continuous surface for engagement with the connector of the patient support top.

5. The top-loading patient support device of clause 4, wherein when the latch is in the second position, the side surface of the latch is aligned with the side surface of the catch body to form a continuous side surface.

6. The top-loading patient support device of any preceding clause, wherein the latch includes an end section that protrudes at least partly across the open top when the latch is in the second position.

7. The top-loading patient support device of clause 6, wherein the end section is arranged out of alignment with the open top when the latch is in the first position.

8. The top-loading patient support device of any preceding clause, wherein the catch assembly further comprises a pawl assembly including a pawl to selectively fix the position of the catch assembly relative to the support bracket, the pawl being operable

between a locked position and an unlocked position.

9. The top-loading patient support device of clause 8, wherein the pawl includes a lever having a pivot end and a free end opposite the pivot end, and a pawl head that extends from the free end for engagement with teeth of the support bracket.

10. The top-loading patient support device of clause 9, wherein the support bracket includes a pawl track having a number of teeth consecutively arranged for engagement with the pawl head, each tooth including a flat surface and a curved surface opposite the flat surface, the flat surface of one tooth of the number of teeth together with the curved surface of an adjacent tooth of the number of teeth cooperating to define a pawl space for receiving the pawl head therein.

11. The top-loading patient support device of clause 10, wherein the pawl head is selectively received within the pawl space, and the pawl head is blocked against removal from the pawl space while in contact with either of the curved surface or the flat surface of the corresponding tooth.

12. The top-loading patient support device of any preceding clause, further comprising a tilt section for connecting the support bracket to the end support, the tilt section including a locking pin slidably disposed in the support bracket and a locking hole disposed on the end support for receiving the locking pin therein, the locking pin being operable between a locked position within the locking hole and unlocked position that is retracted from the pin hole to selectively attach the support bracket to the end support.

13. The top-loading patient support device of clause 12, further comprising a safety latch assembly including a safety pin and a pin slot receiving the safety pin therethrough, the safety pin including a first section having a first diameter and a second section including a second diameter larger than the first diameter, the pin slot including a latch receptacle sized complimentary to the second section of the safety pin and a slide receptacle sized complimentary to the first section of the safety pin, wherein the safety pin is operable between a latched position in which the second section is received within the latch receptacle to prevent translation of the safety pin along the pin slot to block removal of the locking pin from the locking hole and an unlatched position in which the second section is removed from the latch receptacle to permit translation of the safety pin along the pin slot to allow removal of the locking pin from the locking hole.

14. The top-loading support of any preceding clause, further comprising a tilt assembly for selectively pivoting the support bracket relative to the end support while the support bracket is attached to the end support to assist connection of the catch assembly with the patient support top.

15. The top-loading support of clause 14, wherein the support bracket includes a pair of bracket rails and the tilt assembly includes a release gate pivotably attached to each of the bracket rails and a latch disposed in each release gate and positionable between an unlatched position to allow pivoting of the support bracket relative to the release gate and a latched position to prevent pivoting of the support bracket relative to the release gate.

16. A top-loading patient support device comprising:

a patient support top including a connector disposed at a longitudinal end thereof,
a pair of end supports configured to support the patient support top, and
a catch assembly attached to one of the end supports and including a catch device and a latch assembly, the catch device including a catch housing and a support arm that extends from the catch housing, the support arm including a top surface that defines a receptacle having an open top for receiving the connector of the patient support top, the latch assembly including a latch coupled to the catch housing and pivotable about a pivot axis between a first position that is retracted from the open top of the receptacle and a second position in which the latch extends at least partly across the open top of the receptacle to block removal of the connector from the receptacle.

17. The top-loading patient support device of clause 16, wherein the catch housing includes a main body and a cover configured for attachment to the main body, the main body defining an interior and the latch being received within the interior.

18. The top-loading patient support device of clause 17, wherein the latch includes a latch body having a stem pivotably connected at one end to the catch housing and a tab extending from the stem in a pivot plane of the latch.

19. The top-loading patient support device of clause 18, wherein in the first position the tab is arranged within the interior of the main body and in the second position the tab protrudes from the main body at least partly across the open top of the receptacle to block removal of the connector from the receptacle.

20. The top-loading patient support device of either clause 18 or clause 19, wherein the stem is configured to receive force by a user to pivot the latch between the first and second positions.

21. The top-loading patient support device of any one of clauses 18 to 20, wherein the latch assembly includes a resilient member arranged to bias the latch into the second position.

22. The top-loading patient support device of clause 21, wherein the tab includes a slanted upper surface adapted for contact with the connector of the patient

support top to pivot the latch from the second position towards the first position to permit passage of the connector through the open top of the receptacle.

23. The top-loading patient support device of either clause 21 or clause 22, wherein the tab includes a lower surface adapted for contact with the connector of the patient support top and facing radially outward from the pivot axis such that contact with the connector does not pivot the latch from the second position towards the first position to block removal of the connector from the receptacle.

24. The top-loading patient support device of any one of clauses 16 to 23, wherein the top surface of the support arm has a U-shape.

25. The top-loading patient support device of clause 24, wherein the open top of the receptacle is sized to allow the connector of the patient support top to pass therethrough into the receptacle.

26. The top-loading patient support device of any one of clauses 16 to 25, further comprising a tilt section for selectively connecting the support bracket to the end support, the tilt section including a locking pin slidably disposed in the support bracket and a locking hole disposed on the end support for receiving the locking pin therein, the locking pin being operable between a locked position within the locking hole and unlocked position retracted from the locking hole to selectively attach the support bracket to the end support.

27. The top-loading patient support device of clause 26, further comprising a safety latch assembly including a safety pin and a pin slot receiving the safety pin therethrough, the safety pin including a first section having a first diameter and a second section including a second diameter larger than the first diameter, the pin slot including a latch receptacle sized complimentary to the second section of the safety pin and a slide receptacle size complimentary to the first section of the safety pin, wherein the safety pin is operable between a latched position in which the second section is received within the latch receptacle to prevent translation of the safety pin along the pin slot to block removal of the locking pin from the locking hole and an unlatched position in which the second section is removed from the latch receptacle to permit translation of the safety pin along the pin slot to allow removal of the locking pin from the locking hole.

28. The top-loading support of any one of clauses 16 to 27, further comprising a tilt assembly for pivoting the support bracket relative to the end support while the support bracket is attached to the end support to assist connection of the catch assembly with the patient support top.

29. The top-loading support of clause 28, wherein the support bracket includes a pair of bracket rails and the tilt assembly includes a release gate pivotably attached to each of the bracket rails and a bolt latch disposed in each release gate and slidable between an unlatched position to allow pivoting of the support bracket relative to the release gate and a latched position to prevent pivoting of the support bracket relative to the release gate.

30. A patient support device comprising:

a patient support top including a connector disposed at an end thereof,
an end support configured to support the patient support top, and
a support attachment connected with the end support and including a catch assembly configured for selective connection with the connector of the patient support top, the catch assembly including a receptacle for receiving the connector and a latch assembly for selectively blocking removal of the connector from the receptacle, the receptacle including an entry opening for acceptance of the connector of the patient support top into the receptacle.

31. The patient support device of clause 30, wherein the latch assembly includes a latch operable between a first position in which the latch is clear from the entry opening to allow acceptance of the connector within the receptacle and a second position in which the latch extends at least partly across the entry opening to block removal of the connector from the receptacle.

32. The patient support device of clause 31, wherein the support attachment includes a bracket and the catch assembly is connected with the bracket, the bracket including a tilt assembly for selective pivoting of the catch assembly while secured with the end support to assist selective connection with the patient support top.

33. The patient support device of clause 32, wherein the tilt assembly includes a release gate secured with the end support and attached to a rail of the bracket for selective pivoting of the catch assembly, and a tilt lock assembly operable between an unlatched state to allow pivoting of the rail relative to the release gate and a latched position to block pivoting of the rail relative to the release gate.

34. The patient support device of clause 33, wherein the tilt lock assembly includes a lock shaft rotatably mounted in one of the rail and the release gate and operable between a locked position to engage both the rail and the release gate to block relative pivoting and an unlocked position to at least partly disengage with the other of the rail and the release gate to allow relative pivoting.

35. The patient support device of clause 34, wherein the tilt lock assembly includes a lock slot defined within the other of the rail and the release gate, the lock slot including a lock home and a pivot route extending for a length from the lock home.

36. The patient support device of clause 35, wherein the length of the pivot route has a curvature corresponding with pivoting of the rail relative to the release gate.

37. The patient support device of either clause 35 or clause 36, wherein the lock shaft extends into the lock slot, the lock shaft and the lock slot formed in correspondence with each other to prevent relative entry of the lock shaft into the pivot route in the locked position.

38. The patient support device of any one of clauses 35 to 37, wherein the lock shaft extends into the lock slot, the lock shaft and the lock slot formed in correspondence with each other to permit selective rotation of the lock shaft only when arranged within the lock home.

39. The patient support device of any one of clauses 35 to 38, wherein the lock shaft extends into the lock slot, the lock shaft and the lock slot formed in correspondence with each other to permit relative traversal of the lock shaft within the pivot route only in the unlocked position.

40. The patient support device of clause 39, wherein the lock shaft has a non-circular cross-section.

41. The patient support device of either clause 39 or clause 40, wherein the lock shaft has a bean shaped cross-section.

42. A support attachment of a patient support device for attachment between an end support and a connector of a patient support top of the patient support device, the support attachment comprising:

a bracket adapted to connect with the end support,

a catch assembly attached with the bracket, the catch assembly including a receptacle for receiving the connector of the patient support top and a latch assembly for selectively blocking removal of the connector from the receptacle, and

a tilt assembly including a release gate pivotably connected with the bracket and including a tilt lock assembly operable between an unlocked state to allow pivoting of the bracket relative to the release gate and a locked state to block pivoting of the bracket relative to the release gate.

43. The support attachment of clause 42, wherein the catch assembly includes a pawl assembly having a pawl adapted to selectively fix the position of the catch assembly relative to the bracket, the pawl being operable between a locked position and an unlocked position.

44. The support attachment of clause 43, wherein the pawl includes a lever having a pawl end and a pawl head that extends from the pawl end for engagement with the bracket.

45. The support attachment of clause 44, wherein the bracket includes a pawl track having a number of teeth consecutively arranged for engagement with the pawl head to selectively fix the position the catch assembly relative to the bracket.

46. The support attachment of clause 45, wherein each tooth includes a first surface and a second surface opposite the first surface.

47. The support attachment of clause 46, wherein the first surface of one tooth of the number of teeth together with the second surface of an adjacent tooth of the number of teeth cooperating to define a pawl space for receiving the pawl head therein to selectively fix the position of the catch assembly.

48. The support attachment of clause 47, wherein the pawl head is selectively received within the pawl space, and the pawl head is blocked against removal from the pawl space by at least one of the first and second surfaces of the corresponding teeth without unloading of the catching assembly.

49. The support attachment of either clause 47 or clause 48, wherein the lever is pivotable to place the pawl between the locked and unlocked positions, and pivoting movement of the lever of the pawl corresponds with the pawl space, as defined by the first and second surfaces, to require that the pawl head be located intermediately within the pawl space arranging the pivoting movement of the lever to be free of contact between the pawl head and either of the first and second surfaces to allow the pawl to be operated into the unlocked position.

50. The support attachment of clause 49, wherein the pawl head is located intermediately within the pawl space by translation of the catch assembly along the bracket with the pawl in the locked position.

51. The support attachment of any one of clauses 42 to 50, further comprising a tilt section for connecting the bracket with the end support, the tilt section including a locking pin slidably disposed in the support bracket for engagement with the end support, the locking pin being operable between a locked position projecting from the bracket for engagement with the end support and unlocked position retracted into the bracket.

52. The support attachment of clause 51, wherein the tilt section includes a safety latch assembly having a safety pin and a pin slot receiving the safety pin, the safety pin including a first section having a first diameter and a second section including a second diameter larger than the first diameter.

53. The support attachment of clause 52, wherein the pin slot including a latch receptacle sized complimentary to the second section of the safety pin and a slide receptacle sized complimentary to the first section of the safety pin.

54. The support attachment of clause 53, wherein the safety pin is operable between a latched position in which the second section is received within the latch receptacle to prevent translation of the safety pin along the pin slot to block operation of the locking

pin out of the locked position, and an unlatched position in which the second section is removed from the latch receptacle to permit translation of the safety pin along the pin slot to allow removal of the locking pin from the locked position.

55. The support attachment of any one of clauses 42 to 54, wherein the release gate is attached to a rail of the bracket for selective pivoting and is adapted for securing with the end support, the release gate including a tilt lock assembly including a lockout member positionable between a locked position and an unlocked position to achieve the locked and unlocked states, respectively.

56. The support attachment of clause 55, wherein the lockout member of the tilt lock assembly includes a lock shaft rotatably arranged in at least one of the rail and the release gate and operable between a locked position to engage both the rail and the release gate to block relative pivoting and an unlocked position to allow relative pivoting.

57. The support attachment of clause 56, wherein the tilt lock assembly includes a lock slot defined within the other of the release gate and the rail, the lock slot including a lock home and a pivot route extending for a length from the lock home.

58. The support attachment of clause 57, wherein the length of the pivot route has a curvature corresponding with pivoting of the rail relative to the release gate.

59. The support attachment of any one of clauses 56 to 58, wherein the lock shaft extends into the lock slot, the lock shaft and the lock slot formed in correspondence with each other to prevent relative entry of the lock shaft into the pivot route in the locked position.

60. The support attachment of any one of clauses 56 to 59, wherein the lock shaft extends into the lock slot, the lock shaft and the lock slot formed in correspondence with each other to permit selective rotation of the lock shaft only when arranged within the lock home.

61. The support attachment of any one of clauses 56 to 60, wherein the lock shaft extends into the lock slot, the lock shaft and the lock slot formed in correspondence with each other to permit relative traversal of the lock shaft within the pivot route only in the unlocked position.

62. The support attachment of clause 61, wherein the shaft has a non-circular cross-section.

63. The support attachment of either clause 61 or clause 62, wherein the shaft has a bean shaped cross-section.

Claims

1. A patient support device comprising:

a patient support top including a connector disposed at an end thereof,

an end support configured to support the patient support top, and

a support attachment connected with the end support and including a catch assembly configured for selective connection with the connector of the patient support top, the catch assembly including a receptacle for receiving the connector and a latch assembly for selectively blocking removal of the connector from the receptacle, the receptacle including an entry opening for acceptance of the connector of the patient support top into the receptacle.

2. The patient support device of claim 1, wherein the latch assembly includes a latch operable between a first position in which the latch is clear from the entry opening to allow acceptance of the connector within the receptacle and a second position in which the latch extends at least partly across the entry opening to block removal of the connector from the receptacle.

3. The patient support device of either claim 1 or claim 2, wherein the support attachment includes a bracket and the catch assembly is connected with the bracket, the bracket including a tilt assembly for selective pivoting of the catch assembly while secured with the end support to assist selective connection with the patient support top.

4. The patient support device of claim 3, wherein the tilt assembly includes a release gate secured with the end support and attached to a rail of the bracket for selective pivoting of the catch assembly, and a tilt lock assembly operable between an unlatched state to allow pivoting of the rail relative to the release gate and a latched position to block pivoting of the rail relative to the release gate.

5. The patient support device of either claim 3 or claim 4, wherein the tilt lock assembly includes a lock shaft rotatably mounted in one of the rail and the release gate and operable between a locked position to engage both the rail and the release gate to block relative pivoting and an unlocked position to at least partly disengage with the other of the rail and the release gate to allow relative pivoting.

6. The patient support device of claim 5, wherein the tilt lock assembly includes a lock slot defined within the other of the rail and the release gate, the lock slot including a lock home and a pivot route extending for a length from the lock home.

7. The patient support device of claim 6, wherein the length of the pivot route has a curvature correspond-

ing with pivoting of the rail relative to the release gate.

8. The patient support device of either claim 6 or claim 7, wherein the lock shaft extends into the lock slot, the lock shaft and the lock slot formed in correspondence with each other to prevent relative entry of the lock shaft into the pivot route in the locked position.

9. The patient support device of any one of claims 6 to 8, wherein the lock shaft extends into the lock slot, the lock shaft and the lock slot formed in correspondence with each other to permit selective rotation of the lock shaft only when arranged within the lock home.

10. The patient support device of any one of claims 5 to 9, wherein the lock shaft extends into the lock slot, the lock shaft and the lock slot formed in correspondence with each other to permit relative traversal of the lock shaft within the pivot route only in the unlocked position.

11. The patient support device of claim 10, wherein the lock shaft has a non-circular cross-section.

12. The support attachment of any one of claims 3 to 11, wherein the catch assembly includes a pawl assembly having a pawl adapted to selectively fix the position of the catch assembly relative to the bracket, the pawl being operable between a locked position and an unlocked position, wherein the pawl includes a lever having a pawl end and a pawl head that extends from the pawl end for engagement with the bracket.

13. The support attachment of claim 12, wherein the bracket includes a pawl track having a number of teeth consecutively arranged for engagement with the pawl head to selectively fix the position the catch assembly relative to the bracket.

14. The support attachment of claim 13, wherein the pawl head is selectively received within a pawl space defined between adjacent teeth, and the pawl head is blocked against removal from the pawl space by the adjacent teeth absent unloading of the catching assembly.

15. The support attachment of claim 14, wherein the lever is pivotable to place the pawl between the locked and unlocked positions, and pivoting movement of the lever of the pawl corresponds with the pawl space, as defined by the adjacent teeth, to require that the pawl head be located intermediately within the pawl space arranging the pivoting movement of the lever to be free of contact between the pawl head and either of the adjacent teeth to allow the pawl to be operated into the unlocked position.

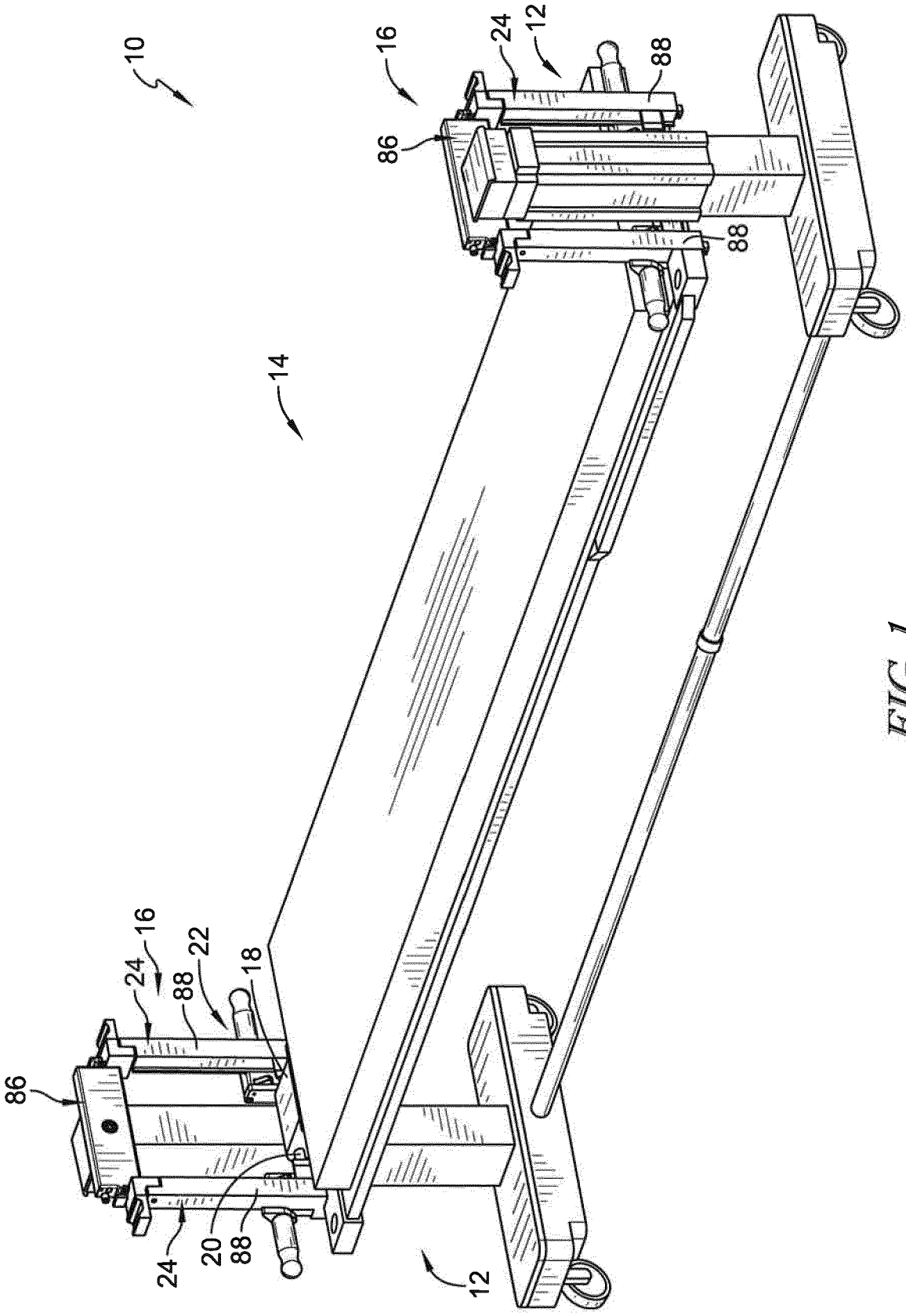

FIG. 1

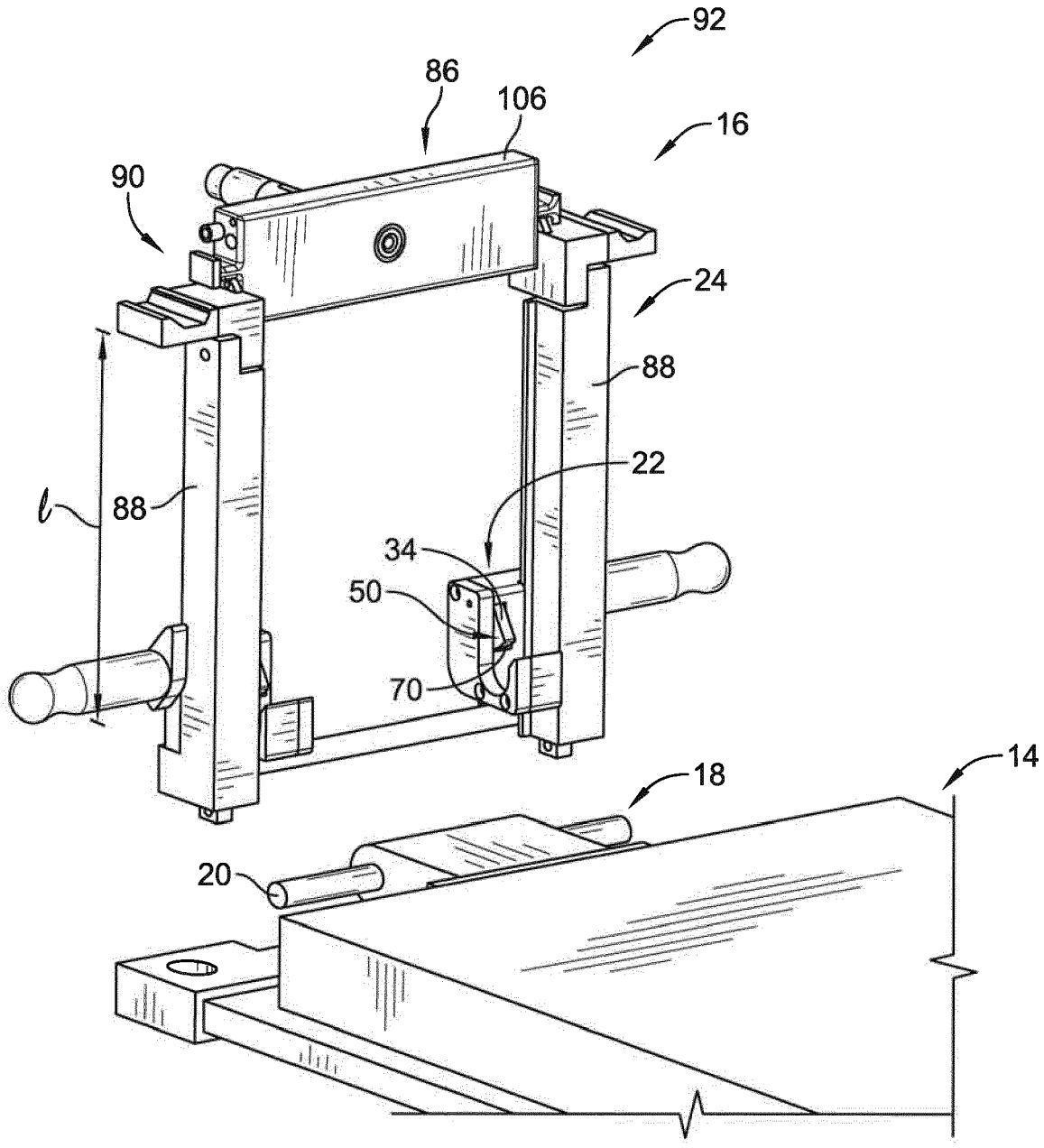

FIG. 2

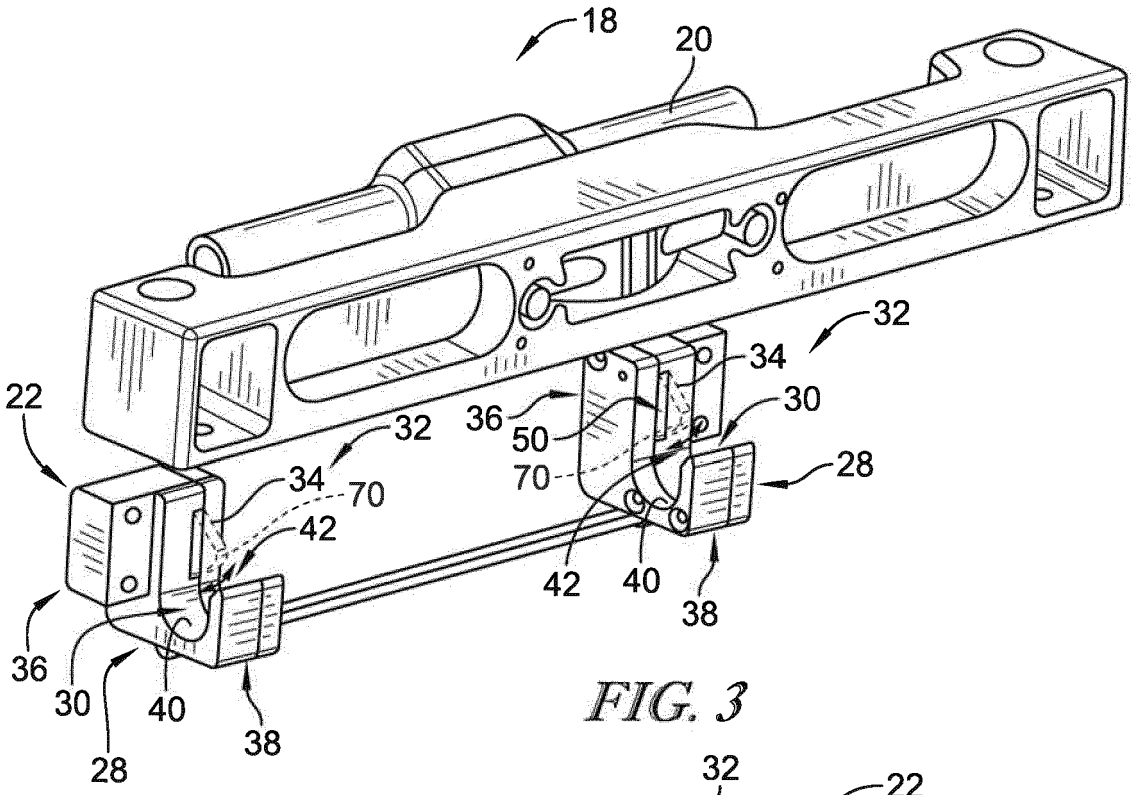
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FIG. 3

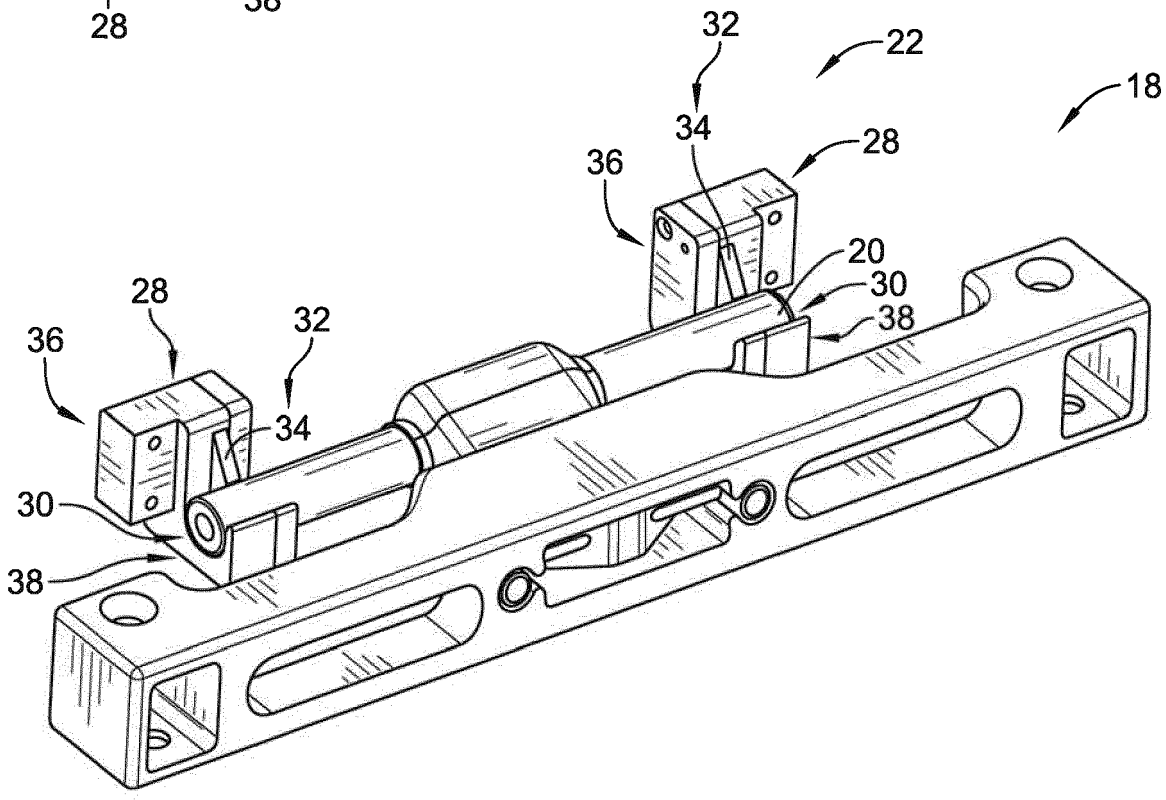
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FIG. 4

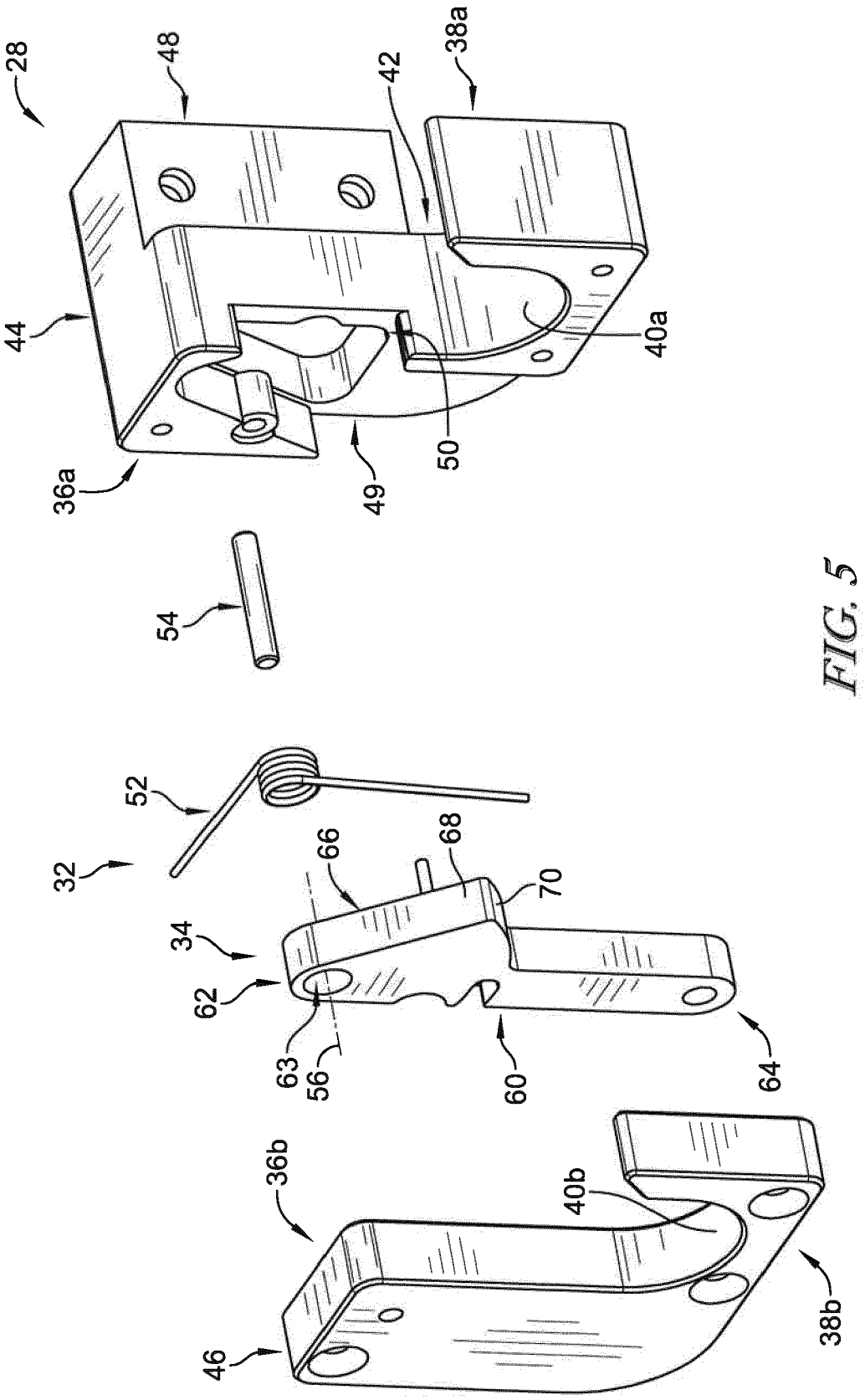
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FIG. 5

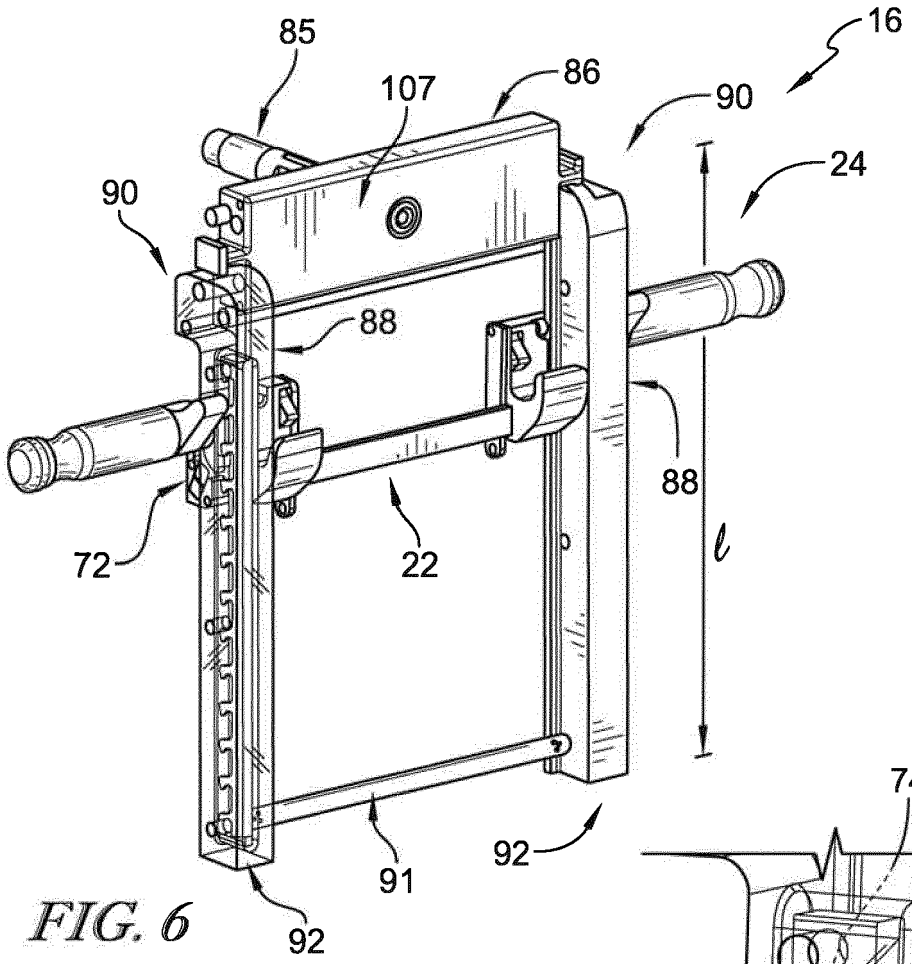
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FIG. 6

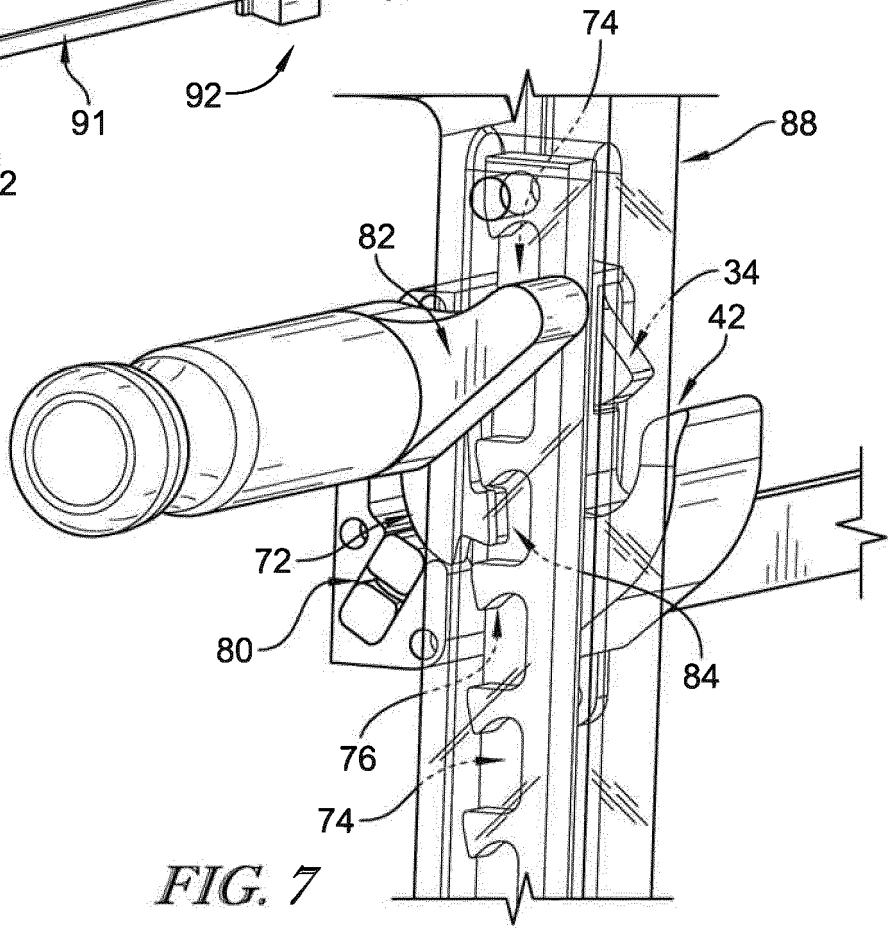
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FIG. 7

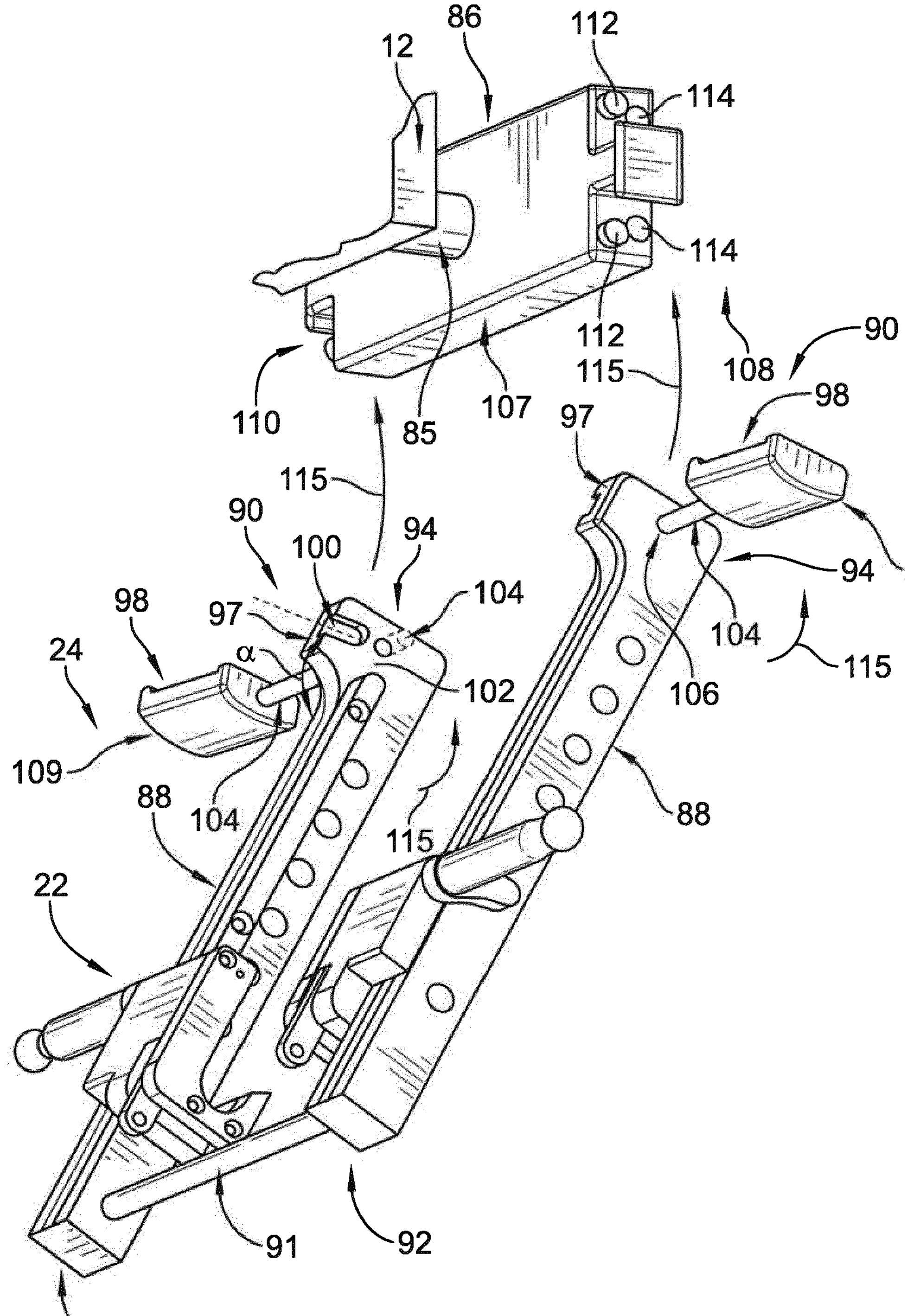
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FIG. 8

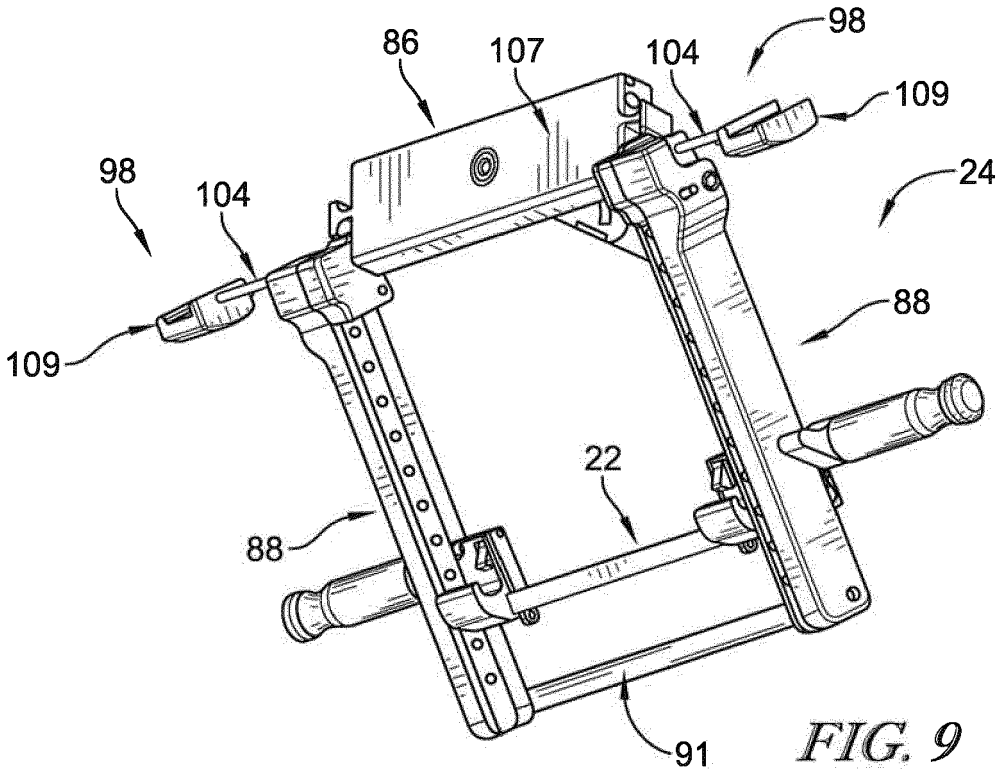
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FIG. 9

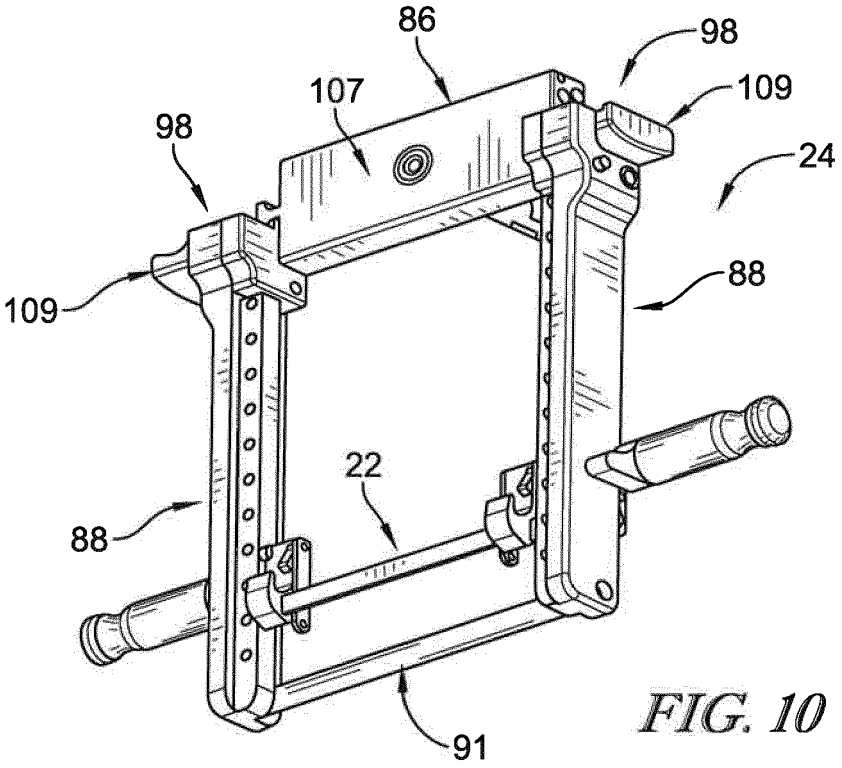
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FIG. 10

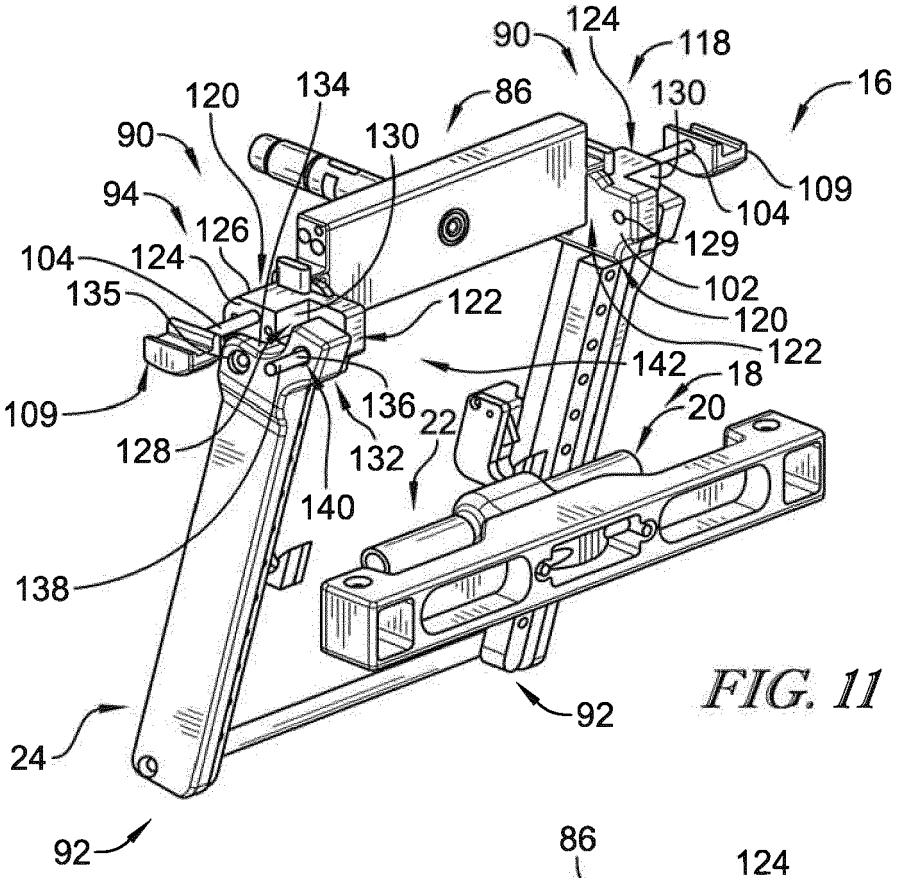
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FIG. 11

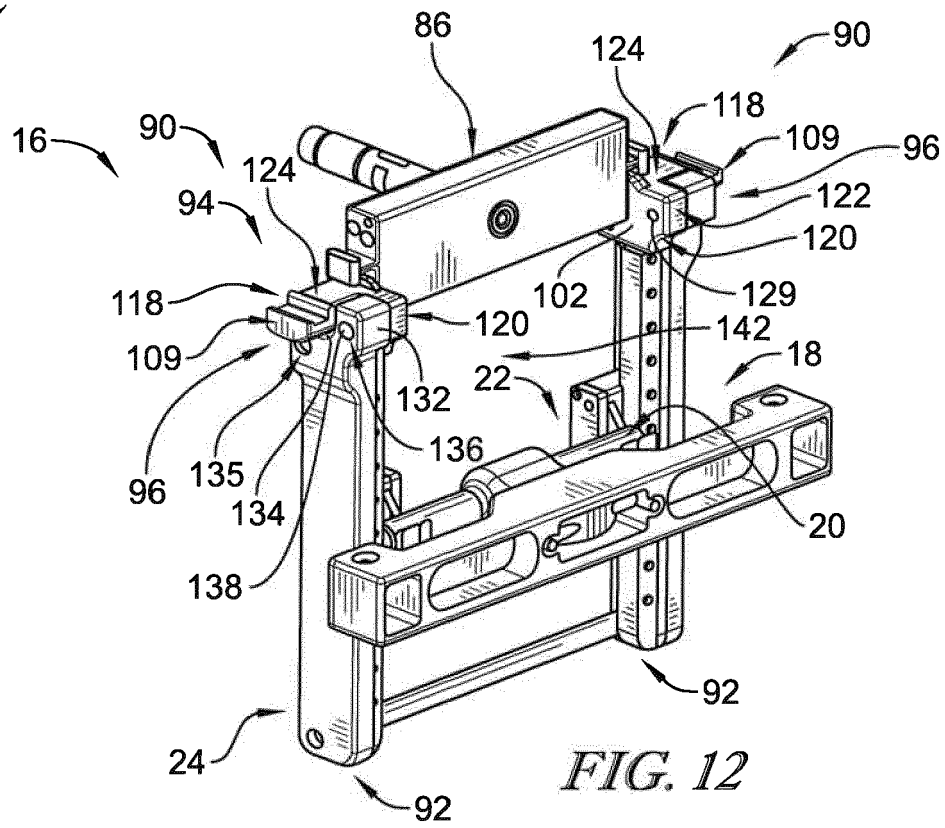
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FIG. 12

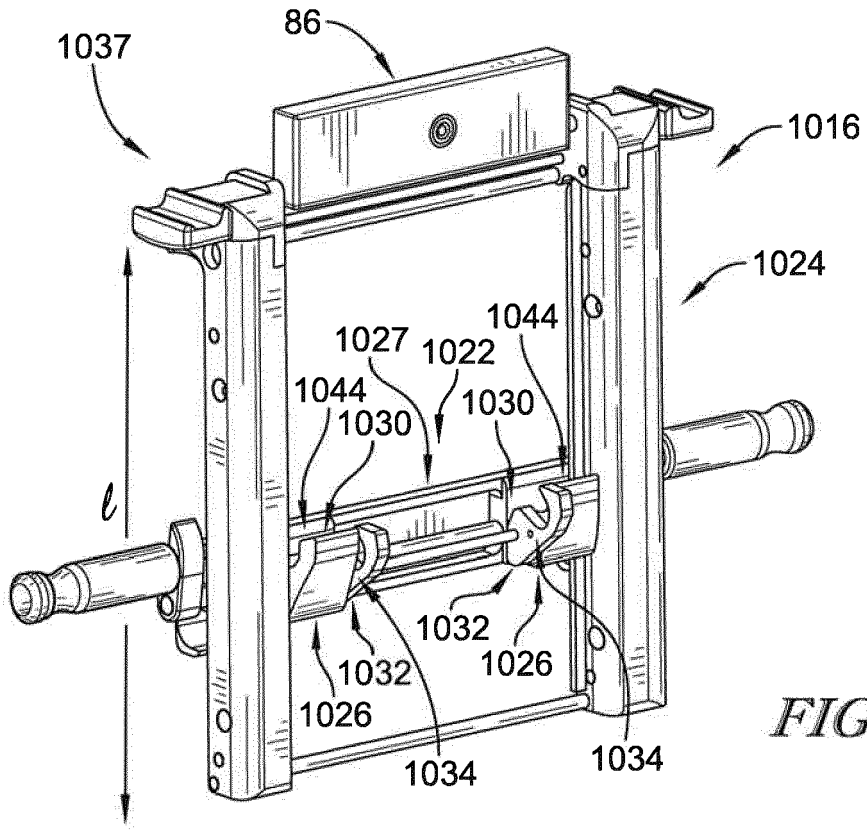
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FIG. 13

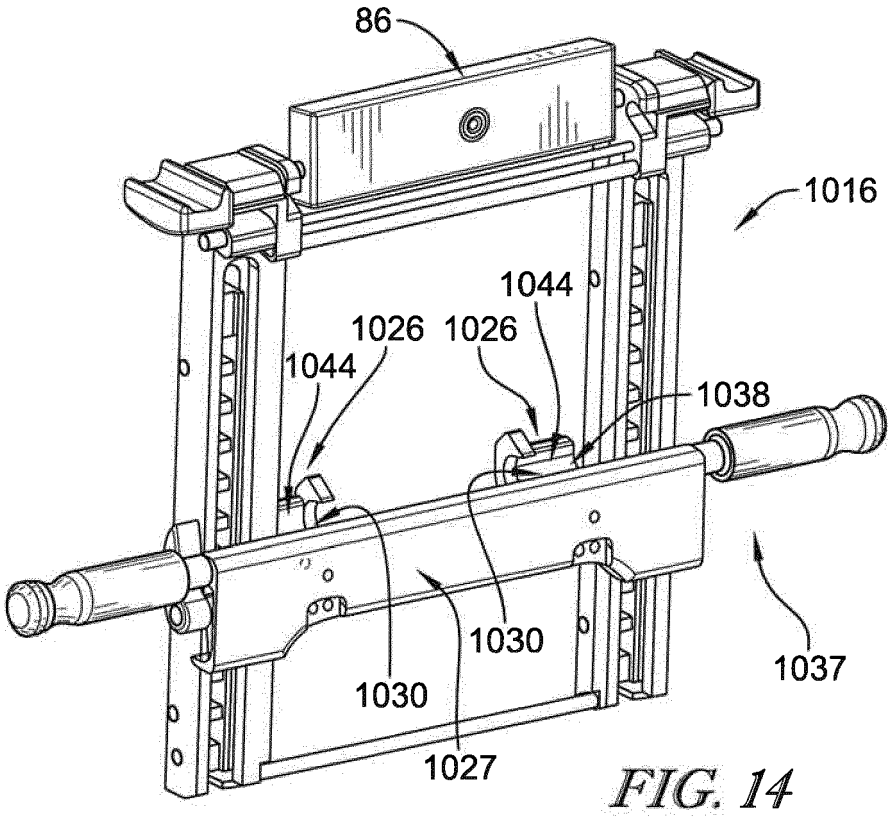
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FIG. 14

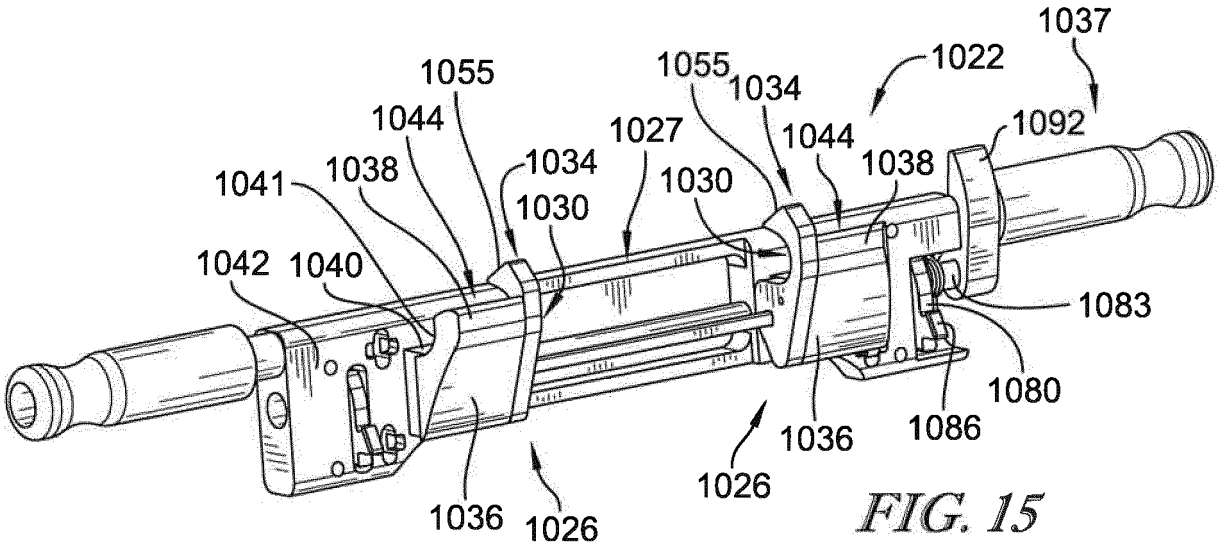
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FIG. 15

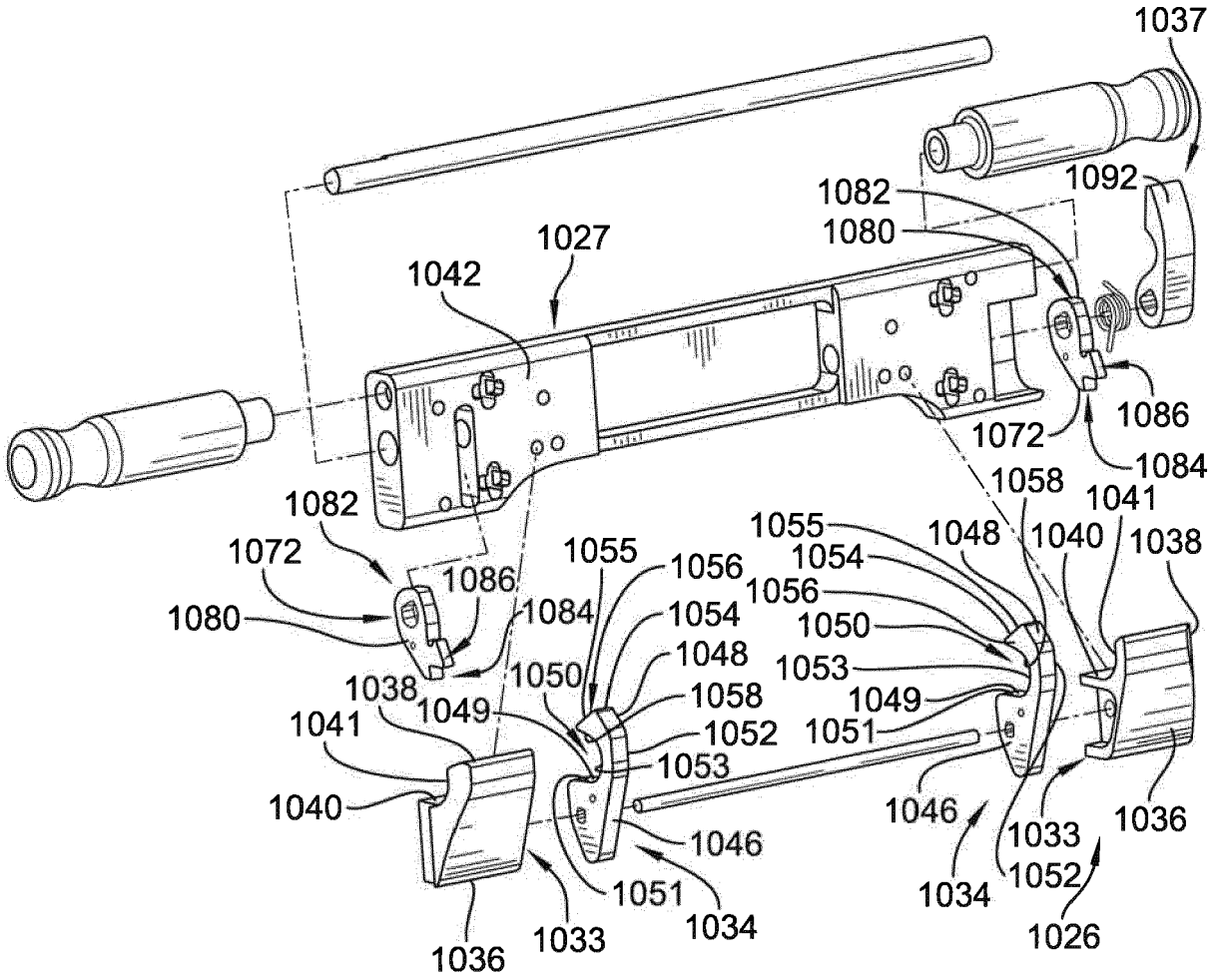
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FIG. 16

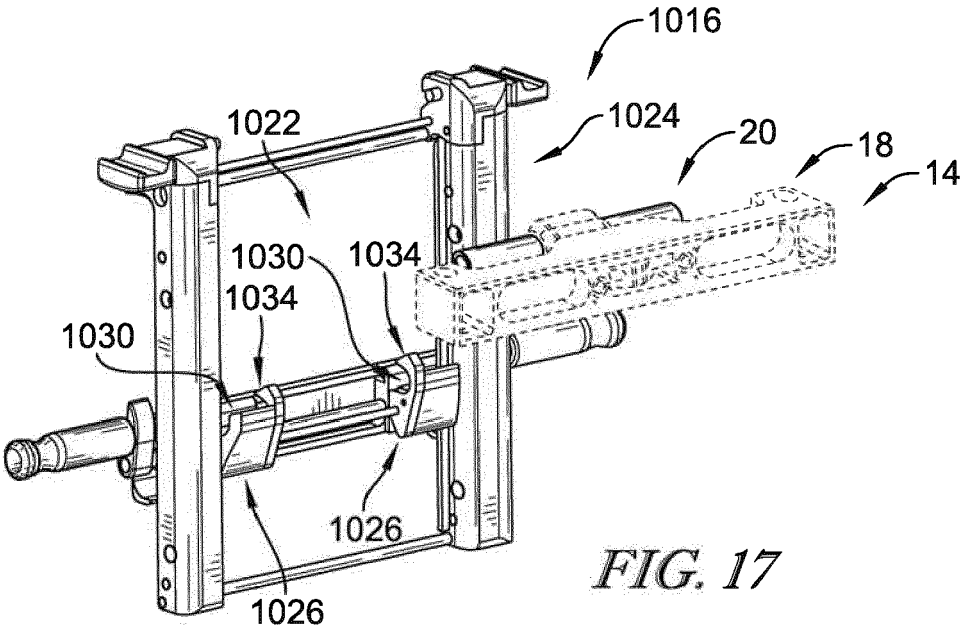
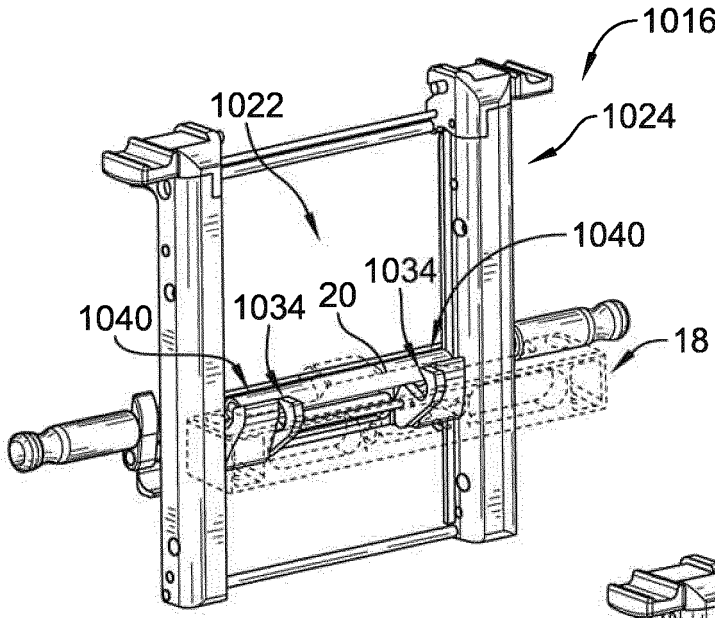


FIG. 17



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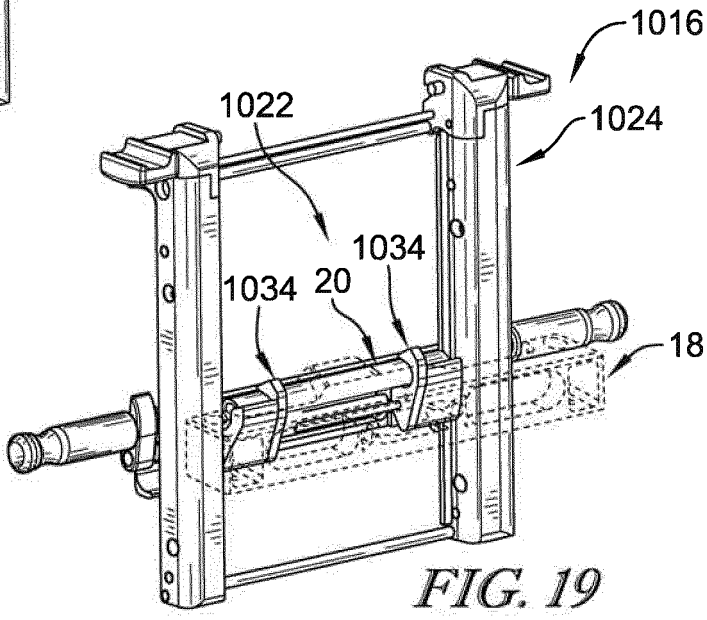
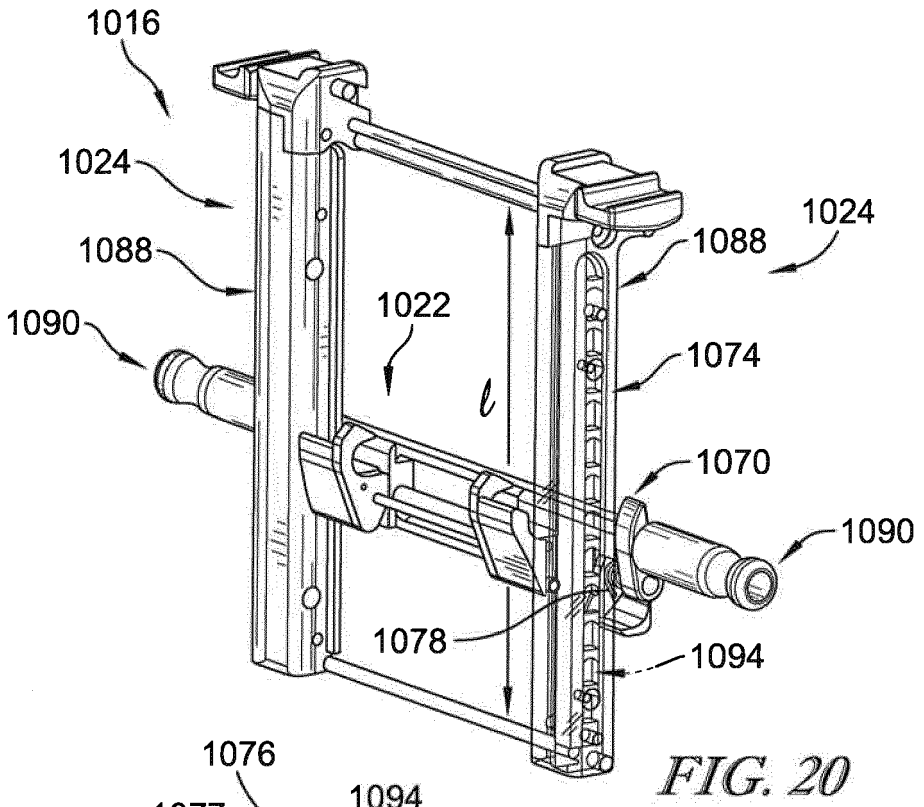


FIG. 19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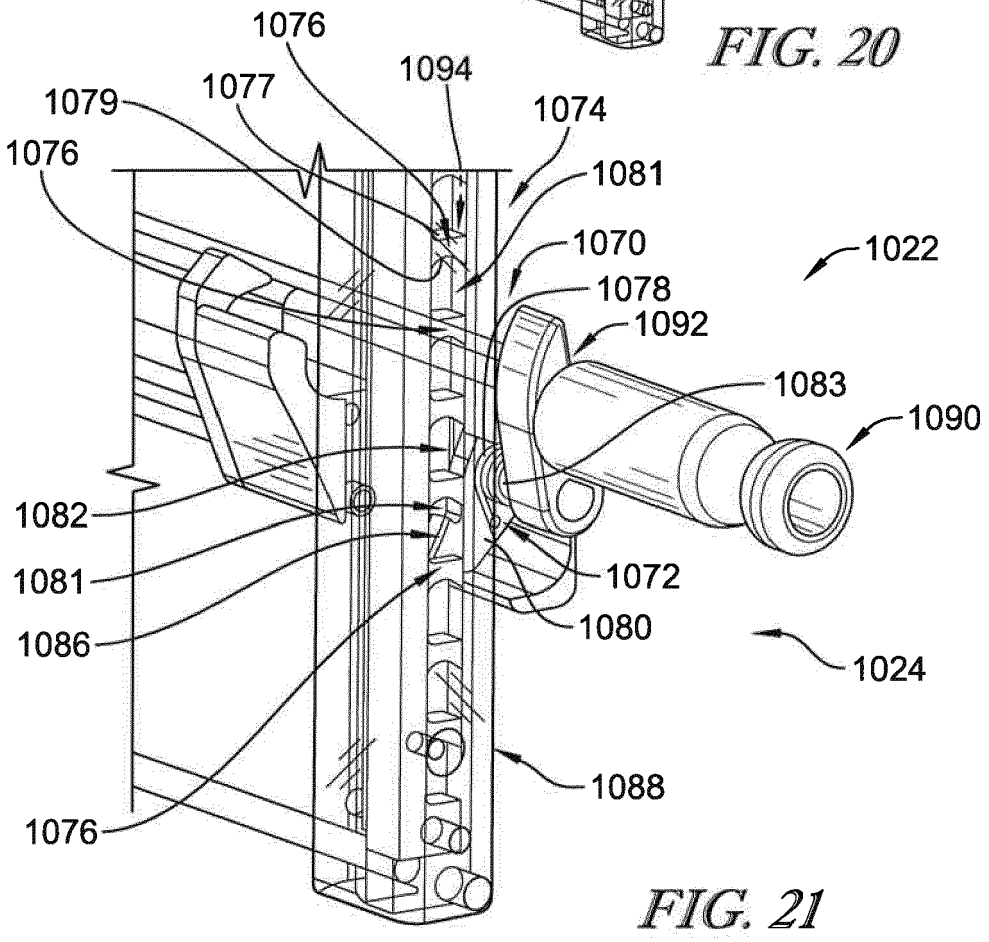
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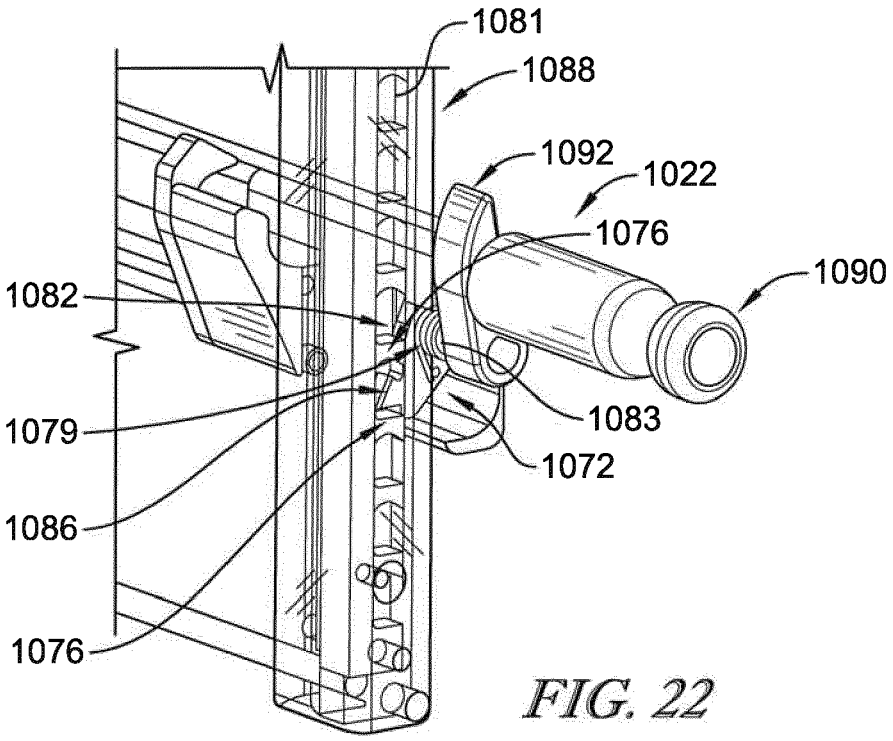
FIG. 21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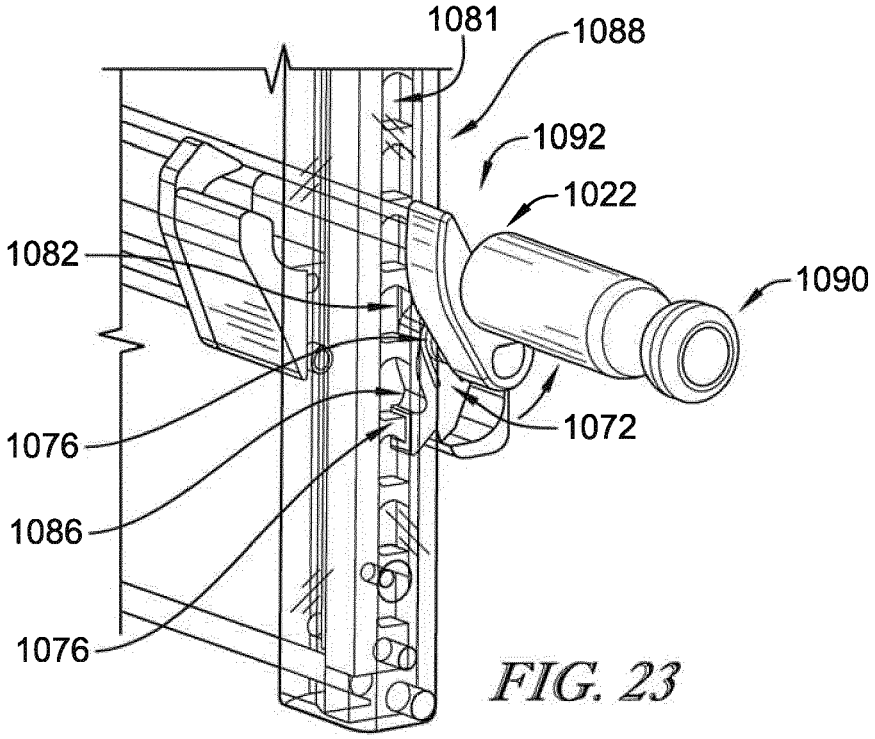
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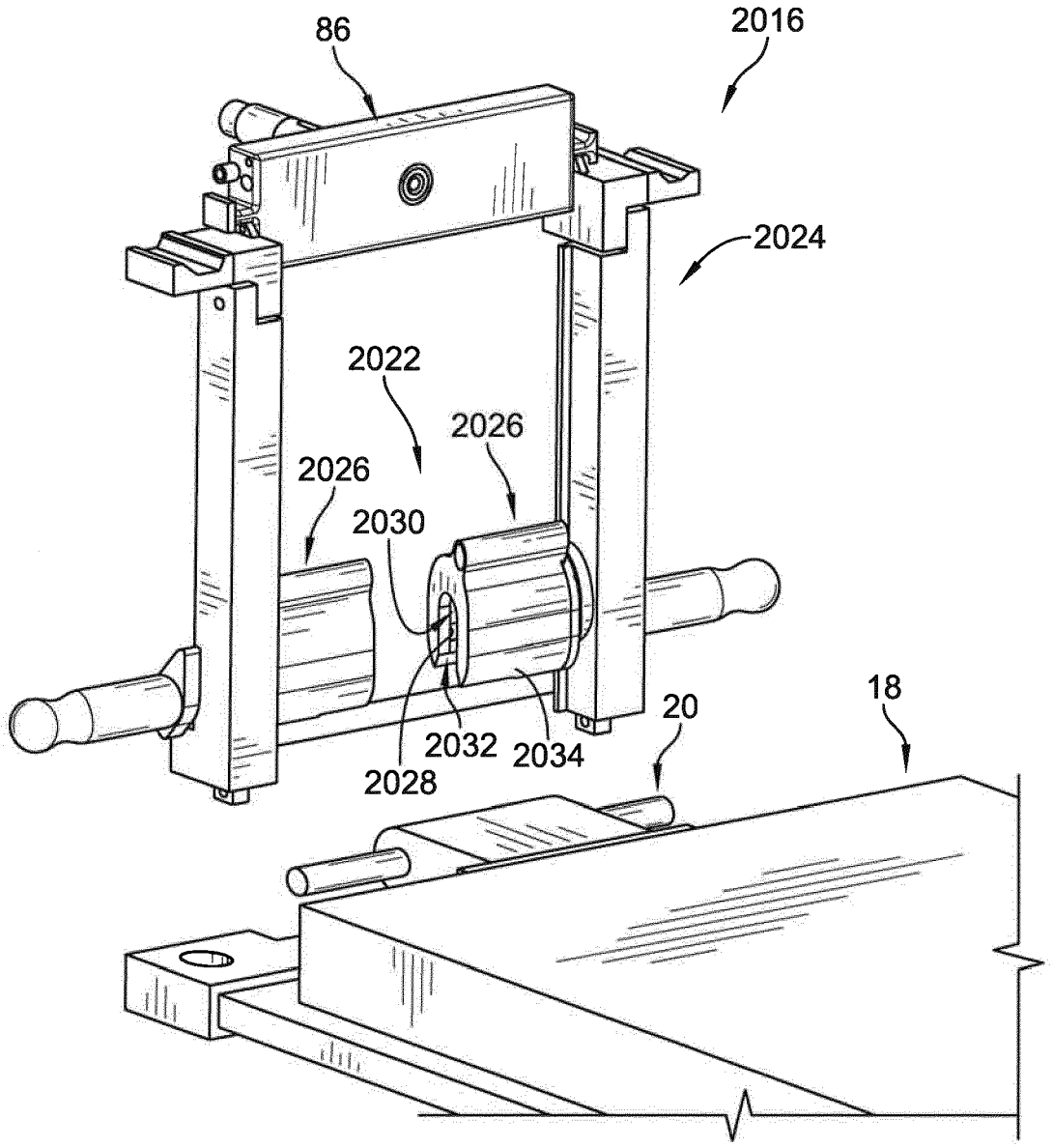
FIG. 23



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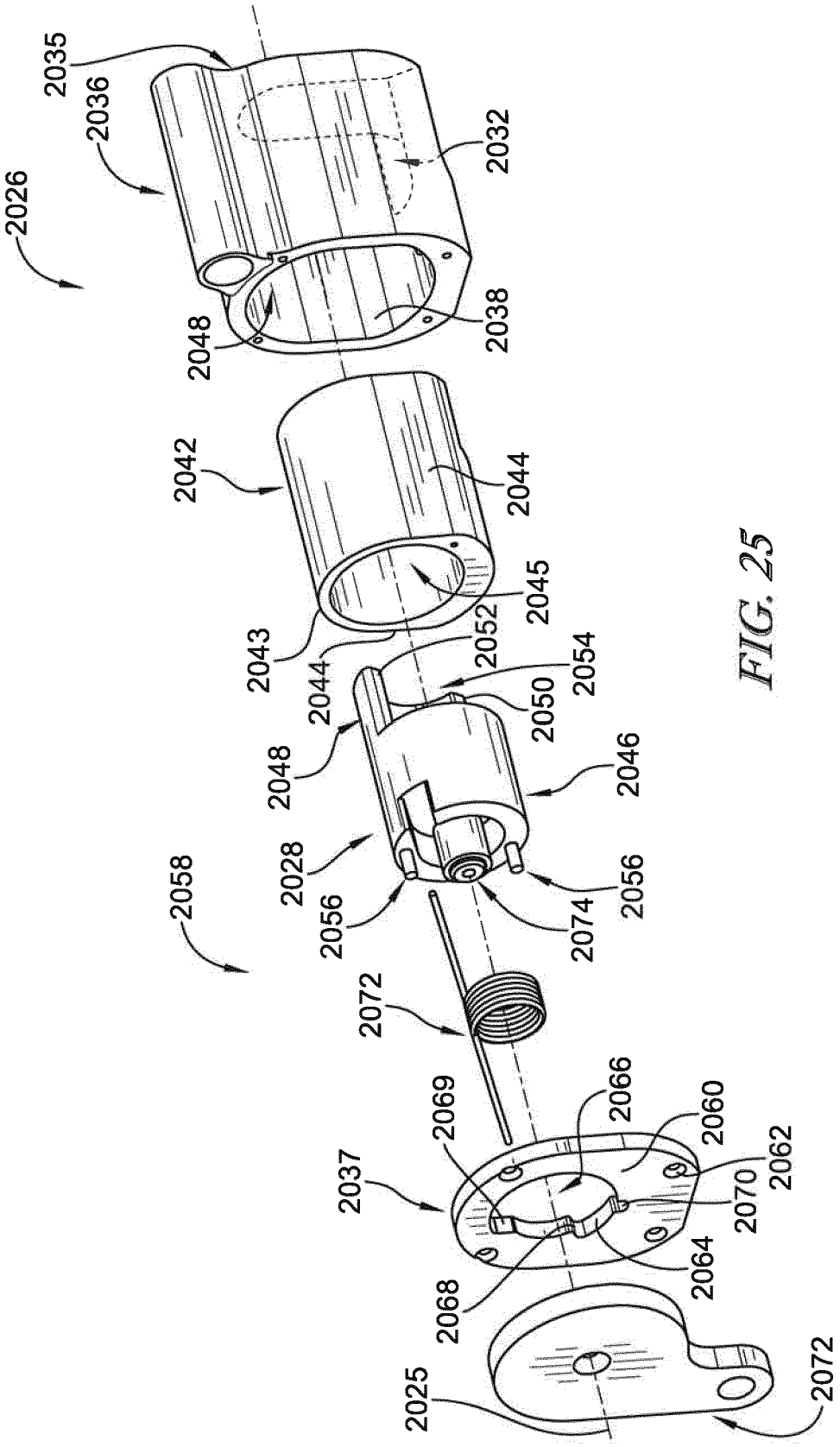
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FIG. 25

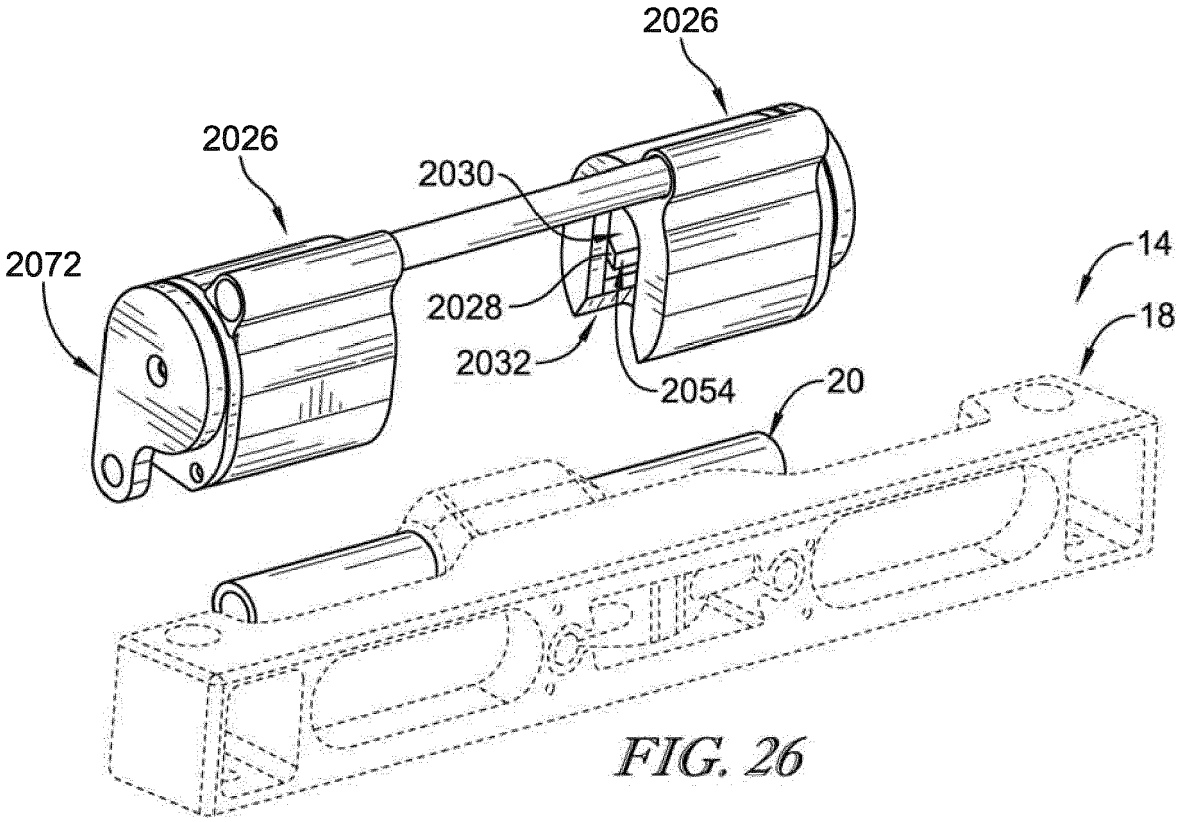
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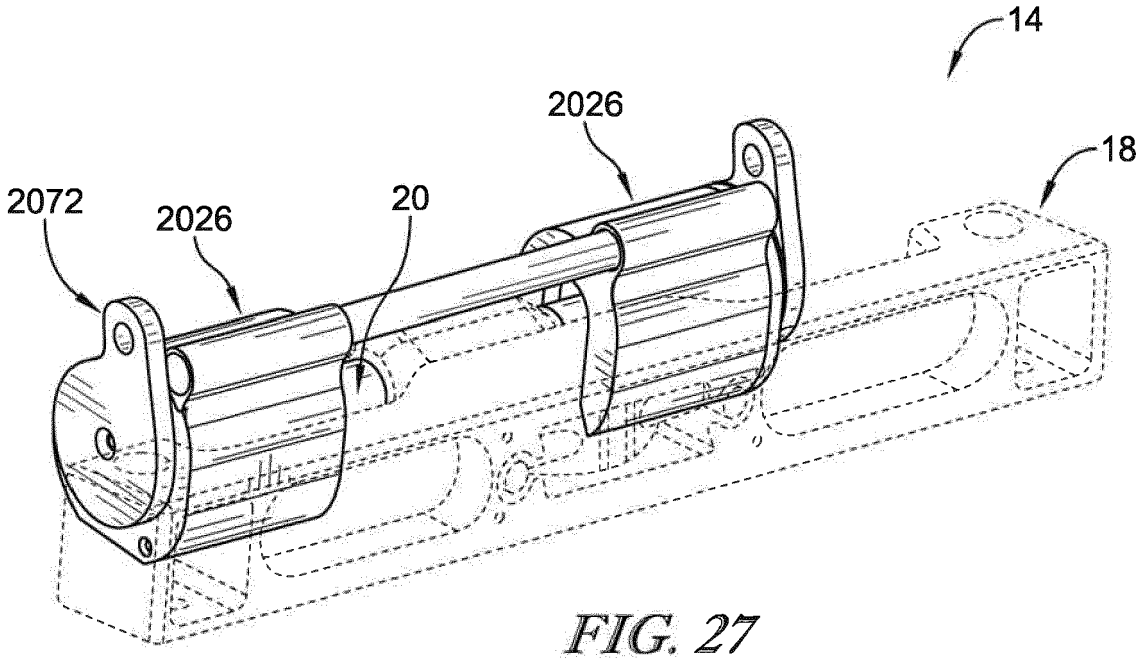
FIG. 26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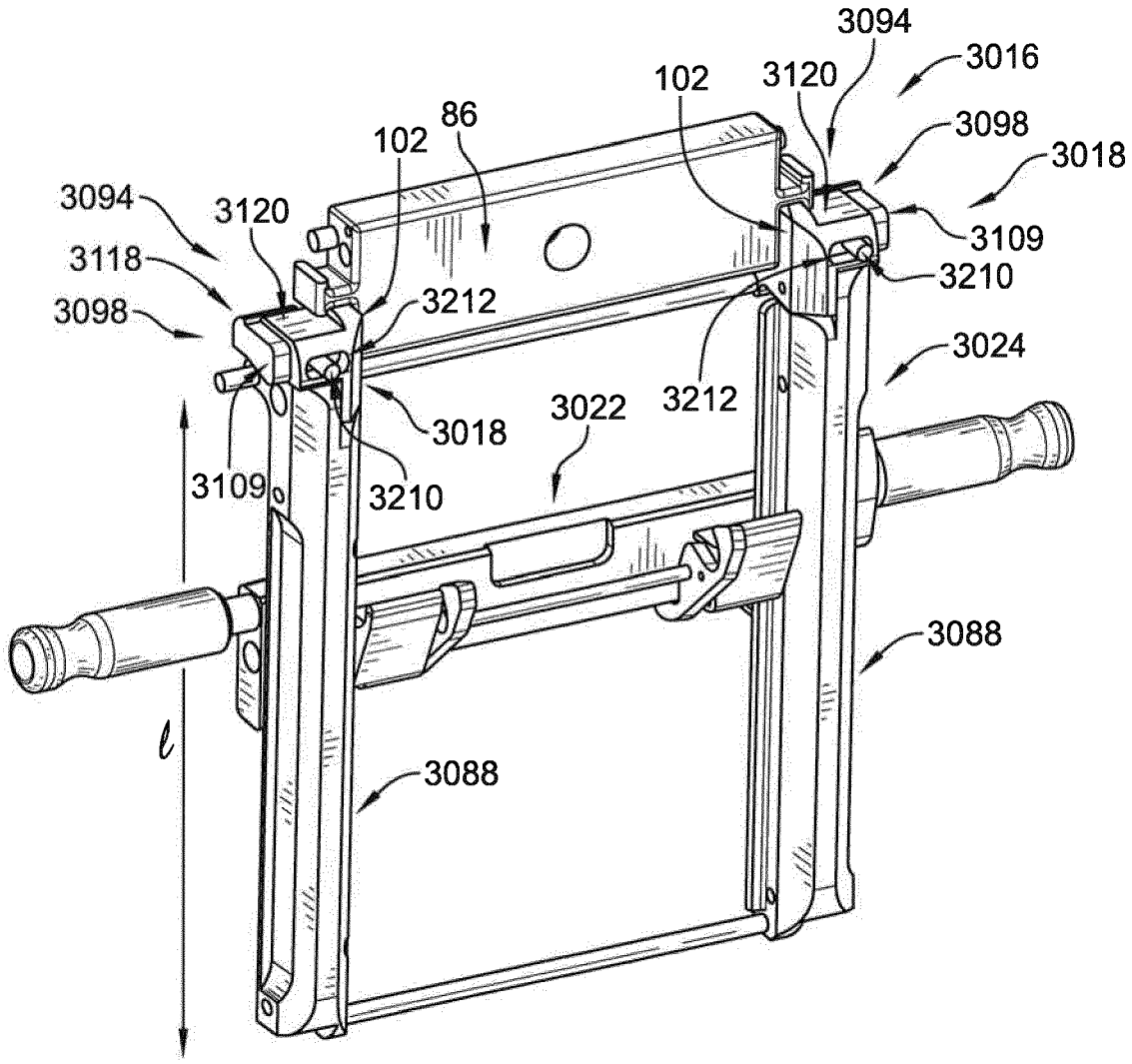
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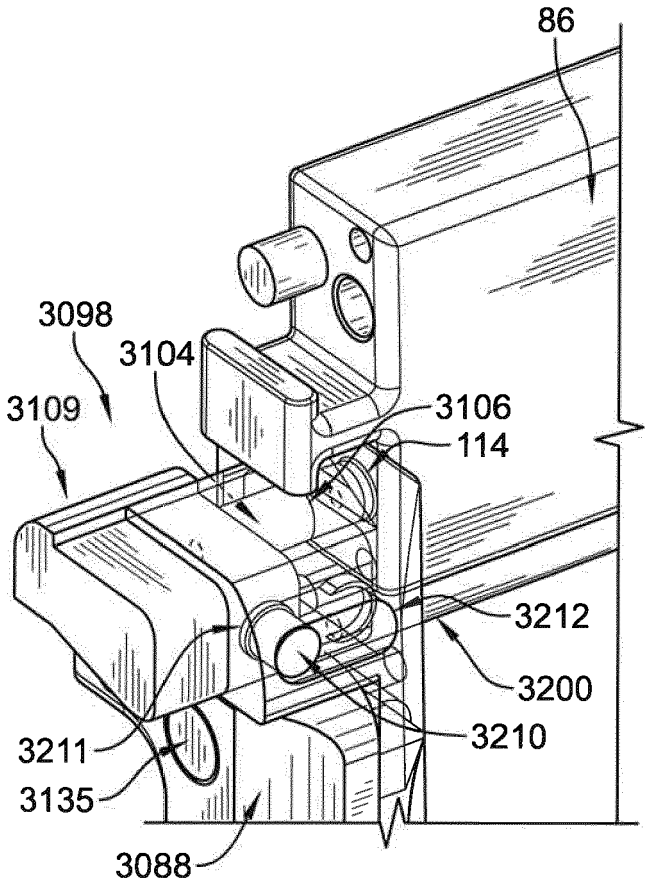
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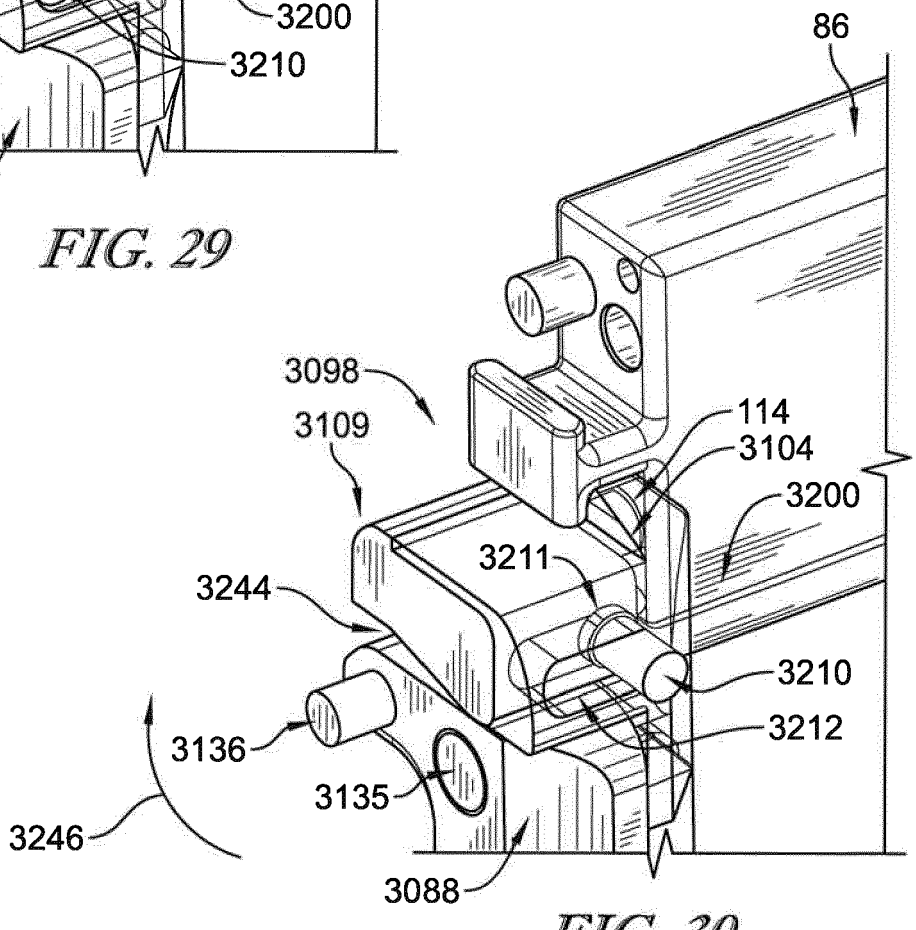
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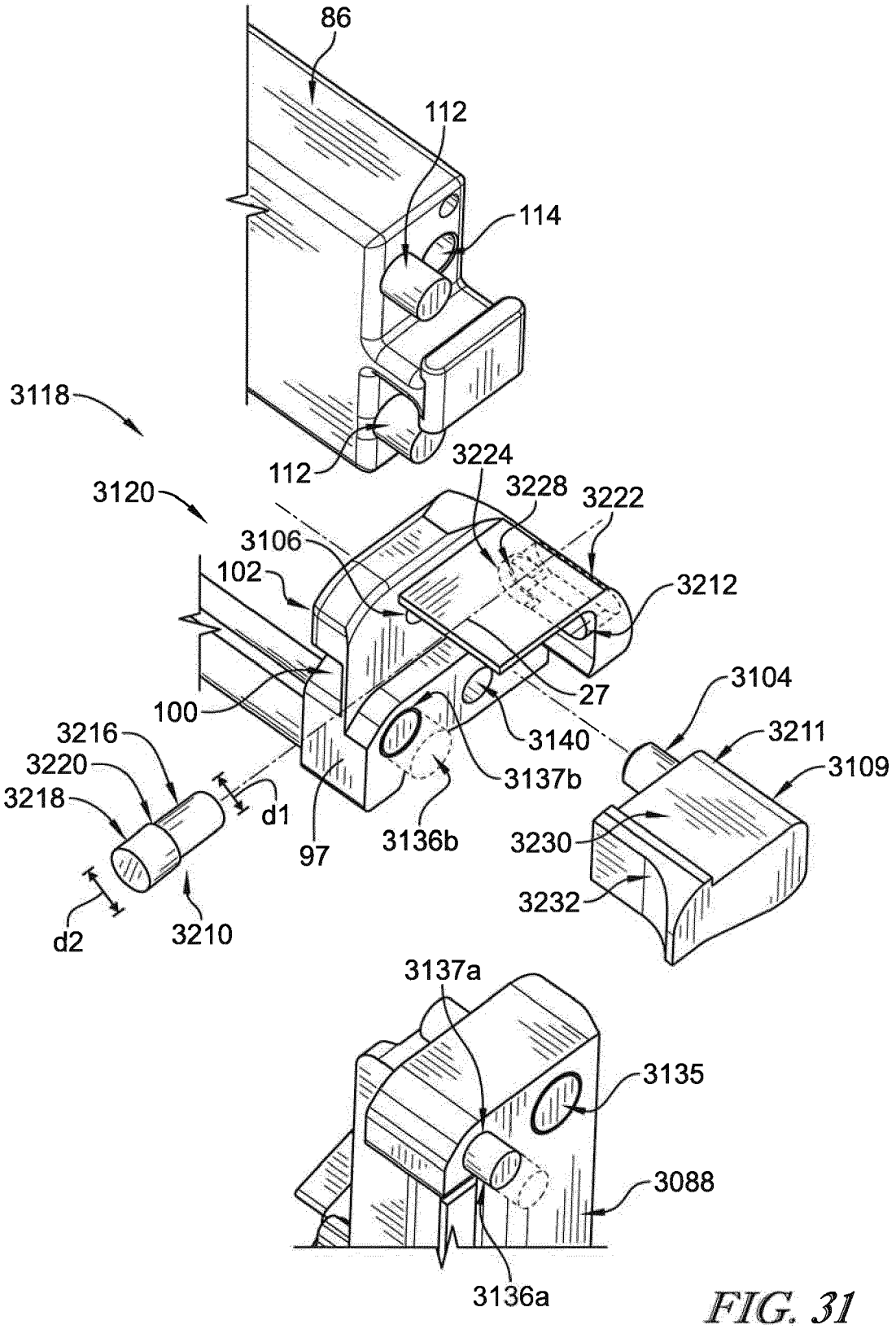
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FIG. 31

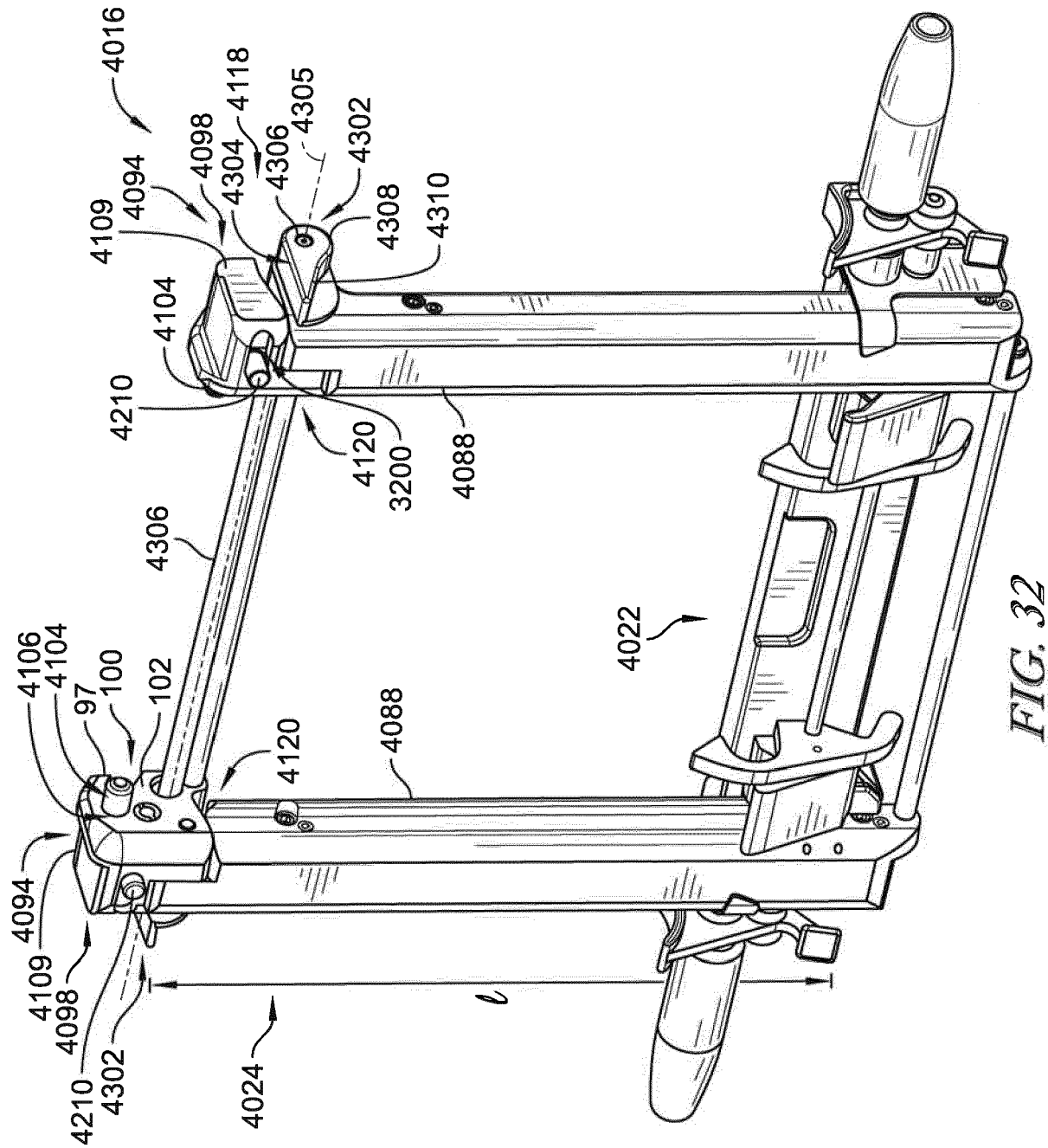
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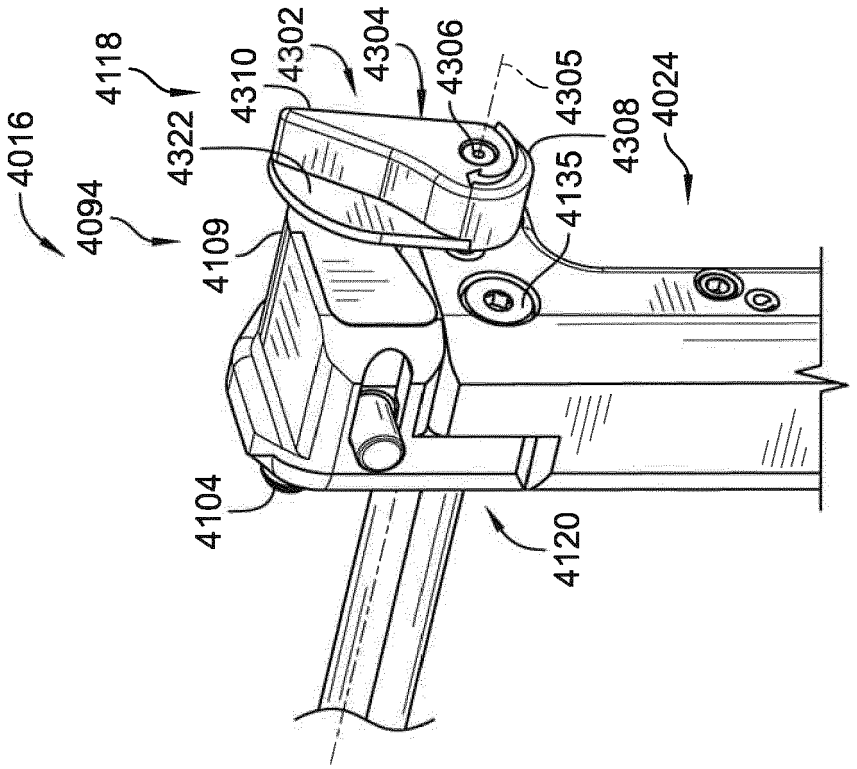
FIG. 32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4104
4120

FIG. 34

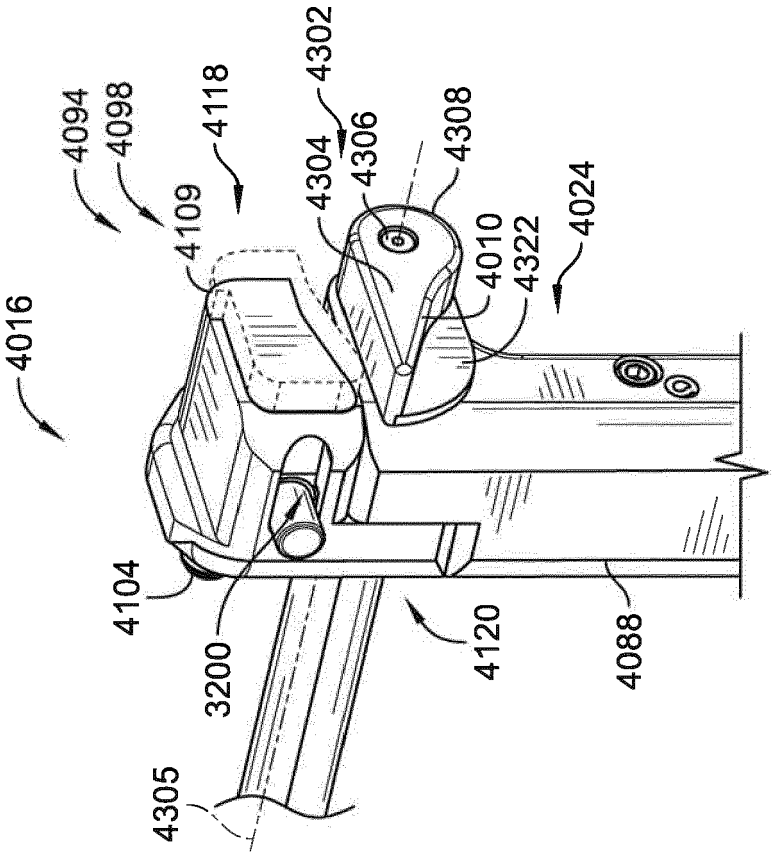
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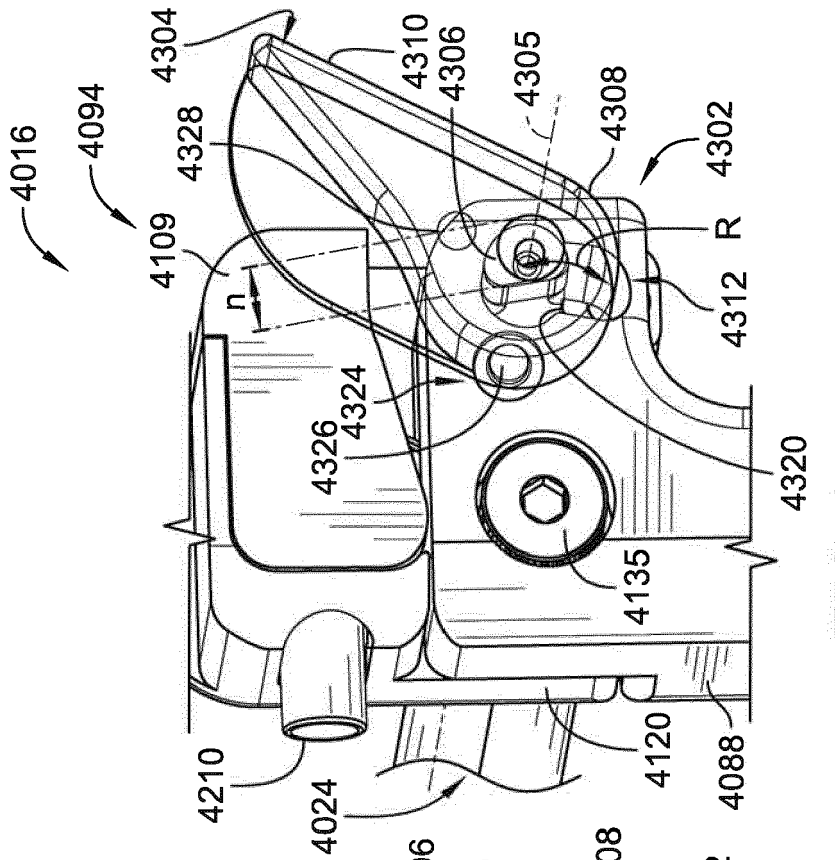
FIG. 33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4135
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FIG. 36

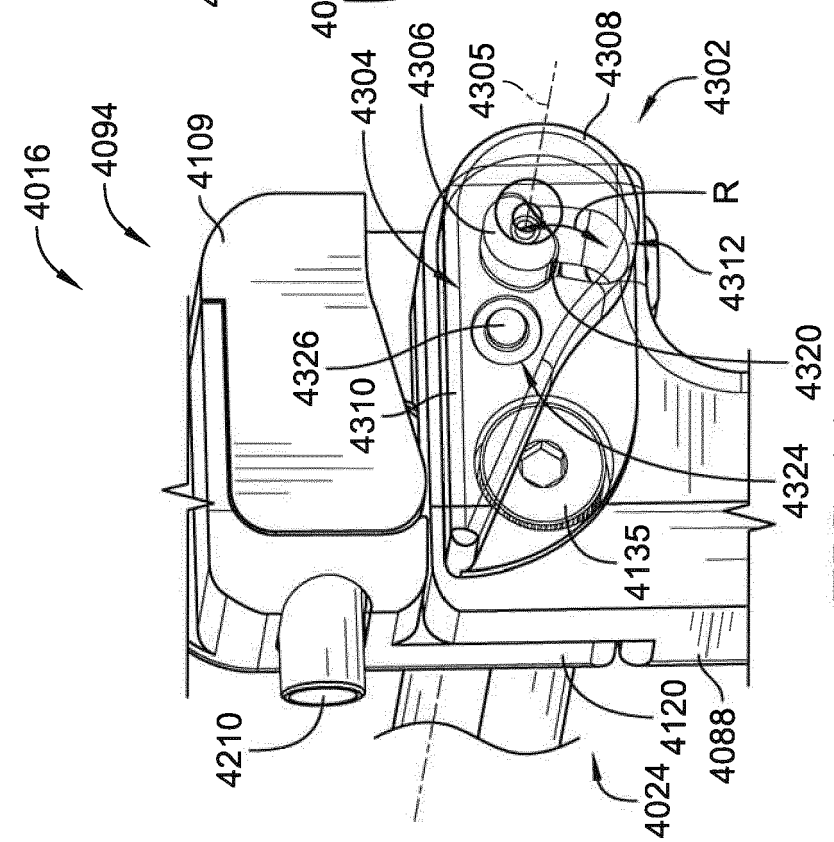
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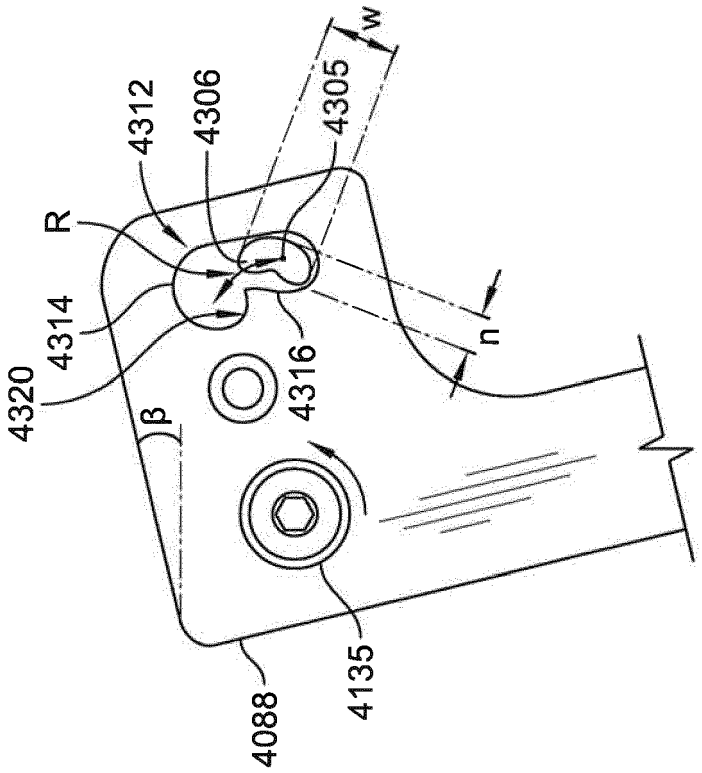
FIG. 35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4316
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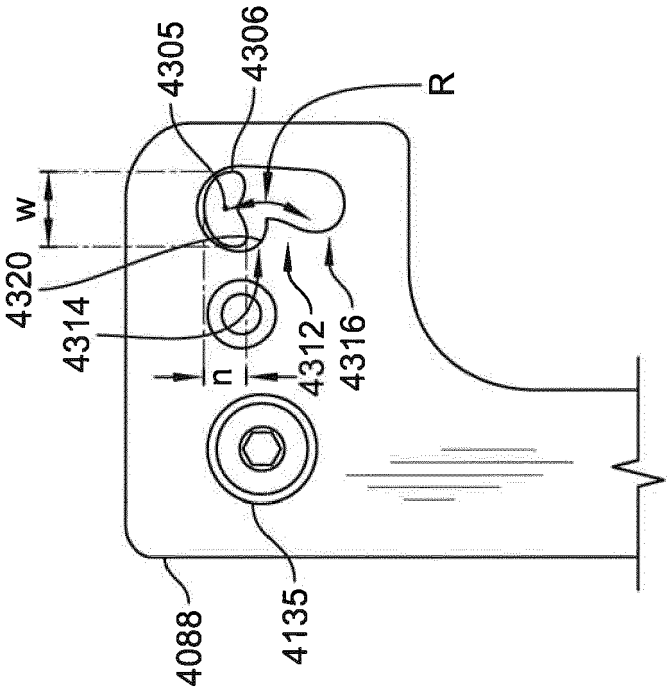
4088
4135

FIG. 38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4314
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4306
R
4088
4135

FIG. 37

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Application Number
EP 17 17 5422

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The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	1 November 2017	Petzold, Jan

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